GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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VOL. CLXXXIX. No. 3480.] WEDNESDAY, JANUARY 29, 1930. [82ND YEAR.

Editorial Notes.

Salaries—An Old Grievance.

FROM time to time for many years past the inadequacy of salaries offered in certain instances for services in connection with the gas industry has been the subject of comment; and we feel that the raising afresh of the question when occasion demands—as it now seems to do—is the course most likely to lead to improvement. The members of the gas profession have struggled to secure their Charter, thus adding to their status; but this status will never be what it should until employers are unanimously resolved to remunerate their chief officials—we are speaking only of them for the moment—on an adequate scale. Therefore, every insufficient offer should be actively protested against, and resisted if possible. The duties of a gas manager are highly responsible, and call for a skilled and fully qualified man, who should be remunerated accordingly.

It will be gathered that the specific instance which calls forth this renewed protest against a harmful state of affairs is the terms proposed by the Lincoln Corporation for a Gas Engineer and Manager. The opinion on the matter of the Committee of the Manchester District Institution of Gas Engineers is voiced in our "Correspondence" column to-day; and with this opinion we find ourselves in entire agreement.

Hedging on the Coal Problem.

THE Government, in its attempt to reduce, without economic justification, but without commercial ruin to the industry, the working hours in the mines, is becoming more and more deeply involved. Events of last week in this connection included the revealing of the amendments which they propose to introduce in the Committee stages next week. As we have so often remarked, it is infinitely regrettable that a great industry should be the sport of politics, and this viewpoint is emphasized by the more or less frank confession that the proposed amendments are framed by the Government party in the hope of appeasing another political party, and not because of the recognition of any inherent weakness in the provisions of the Bill. They are largely concerned with the amalgamation question, which, as far as immediate help or protection for the threatened coal consumers of this country is concerned, is of little interest.

As regards this all-important question of protection, it appears that the Bill is to be regarded as dealing solely with the production of coal, and a separate Bill is to be introduced in the near future setting up a Consumers' Council, which will presumably deal with wholesale and retail prices generally. There is, however, an amendment which provides for reference, as regards pithead prices, to independent arbitration at the instance of any investigating committee or other party concerned. It would be premature to comment upon what, if any, genuine protection can be afforded in this way, until the provisions are debated and passed. It is said that a further amendment is under consideration to deal with the question of contracts already entered into. The protection of these is, of course, of paramount importance to the gas industry; but surely it has never been contemplated that these could in any way be interfered with by any marketing schemes drawn up or passed subsequently to their arrangement. A spirit of optimism is evidenced in a suggestion to fix a definite time limit of about three-and-a-half years for the operation of the marketing schemes, so that they shall be reviewed by Parliament when they have had a fair trial. It will be surprising if the suggested amazing bureaucracy survives twelve months.

In the meantime, the Government proposes to postpone the evil hour of the reduced working day—as evil hour it must inevitably be, when costs per ton suffer an all-round increase—for another three months, which period is supposed to give the marketing schemes a fair chance to become effective. Again, being frankly hostile to the whole principle of the Bill, we are sceptical.

"Economic" Coal Prices.

OUTSIDE of politics, strong disapproval of the Bill is being freely expressed by the business community through its various organizations. The view of the manufacturing section has been very ably stated by the Federation of British Industries, who, after carefully canvassing opinion in all the principal districts, definitely declare that the proposals arouse the gravest apprehensions. Any question of hours, wages, or labour conditions has wisely been omitted, which greatly strengthens the detailed case against Part I. of the Bill. The proposed bureaucratic interference, and the creation of an additional sheltered industry which would have other trades and industries at its mercy, are considered to be points of extreme danger. Another strong condemnation is voiced in a long resolution passed by the Association of British Chambers of Commerce. We need not refer to either of these in detail, as the case against the Bill is well known to our readers, and the summary of it recently given by Sir David Milne-Watson as affecting the gas industry in particular so admirably pointed the general inequity of its provisions. Sir David's pronouncement was referred to last week in a speech by Sir Josiah Stamp, who stated

that the special form of "taxation" which the coalowners would be able to impose could be even more easily—and disastrously—forced upon the railways, which have so much in common with the gas industry in their prosperity or adversity that any ill-advised and reactionary measures must hurt them both in the long run.

An idea in connection with the Bill which is now being assiduously fostered, in quite up-to-date propaganda style, is that the gas industry has in the past not been in the habit of paying an "economic" price for coal. This is being put about in some cases by veiled insinuation, in others by open statement, with the implication that the industry is quite able, and would even be willing, to pay a so-called economic price, since it is itself protected in the matter of prices to its consumers. It is undoubtedly dangerous to allow this notion to go undisputed to the public in general, who, having some hazy idea of the existence of sliding-scale regulations, may quite readily imagine that these constitute protection *to the suppliers* in the matter of charges. Beyond mentioning the danger, we need not labour the point. On the other hand, we may well ask what constitutes an economic price. Gas undertakings have never had powers to compel the collieries to sell to them at any fixed price below market value. If prices paid in the past have been uneconomic to the coal industry, whose is the blame, and why should there be an insinuation of an unfair deal?

What's in a Name?

WHERE gas coke is concerned, it can mean much, either for good or ill. New ideas about gas coke ought to be favourable; if not, there is something wrong with the sales organization of the suppliers. Old ideas—culled from the experience of users prior to the war—may not, probably are not, favourable; if so, there must be something wrong with the publicity organization of the suppliers. Modern gas coke has to withstand the bad effects of old gas coke, but every day the task is becoming easier—it is a further instance of virtue finding its own reward.

There is no reason why still more gas coke should not be used for domestic purposes, both for water heating and for room warming. It is a clean fuel, is truly smokeless, gives a uniform burning fuel bed, requires little draught, and gives a high thermal efficiency; and ignition difficulties gracefully left the stage on the advent of the gas poker-burner. It needs care in its preparation, particularly in regard to choice of low-ash coal and to adequate quenching, handling, and screening of the smokeless fuel. It needs most of all, however, scientific salesmanship. There must be ample demonstration to the public that a little self-restraint in operating coke-consuming equipment will bring great reward. Again, suppliers must concentrate on efficient delivery; the customer may invariably be right; but it does not follow that he or she will be at home if coke is delivered on a day which either precedes or comes after that scheduled. Further, every consumer should be supplied with the appropriate grade of fuel.

Let us grant that the foregoing conditions are fulfilled, and, returning to the title of this note, ask another question: Is it a good policy to sell gas coke under a different name? Some might say that, as it is still gas coke, it ought morally to be sold under the name which has been employed since the existence of the industry. Yet, gas coke of to-day bears very little resemblance to the gas coke of old, and, therefore, there seems ample justification for a new name. There are others who hold the view that the appellation "gas coke" is quite good enough if the fuel supplied is above reproach. Whatever opinion is held, it is noteworthy that several undertakings are removing a sales barrier built up by casual treatment of the business in the past. The latest development in the progressive history of the Liverpool Gas Company is the production of a high-temperature smokeless fuel marketed under the name "Dryco," and so great is the public demand for this fuel that the Directors of the Company, at their last meeting, decided to turn over the whole of their Eccles Street Works to its production. We feel sure that the general coke problem of our industry only needs to be tackled energetically to be solved effectively.

Company Meetings.

WITH the Chairman's address to the shareholders of the Aldershot Gas, Water, and District Lighting Company, we begin this week the publication of the results of the operations of Companies during the past year, and for this reason it will be scanned with close interest. It will be seen that Mr. R. W. Edwards, the Chairman and Managing Director (who is also Aldershot's Mayor), was able to record further substantial progress by this always progressive undertaking; and it is of good augury that in this, the first of our Company reports, there should be set out forward movement in every department. Here we see gas and electricity thriving side by side under one control, as is to be found in other cases in this country, and on a still larger scale in the United States of America, so that clearly success of the one does not spell disaster to the other. In addition to this, Aldershot, of course, has another string to its bow, in the supply of a necessary of life—water.

With regard to gas, the net sales of which for 1929 show an increase of 5 p.ct., the position is eminently satisfactory; for reductions in price are the order of the day. To this vital factor every consideration has been wisely given; for it is the key which will open the door to that much more comprehensive use of gas on the part of the public to which Mr. Edwards is looking forward. Electricity shows the greater percentage increase in sales which is to be expected of a younger industry; and here, again, the sound policy of price reduction is being pursued. With the Aldershot Company set on its present course, there can be no reason to doubt its continued progress and prosperity, and consequently the maintenance of maximum dividends.

Consequences.

FOR some four months now the City of London has been gravely affected by a set of circumstances a parallel to which it would be hard to find; and, owing to the assumed demand on the part of the public for sensationalism, these circumstances have, for the greater part of the time, appeared in much distorted perspective. The amount in question and the fact that British Corporation stocks were involved, together with the position in life of the chief actor, contributed to obscure the essential vulgarity of the scheme; but when all the details were exposed to the calm scrutiny of one of the most eminent Judges, the meanness of the whole plot became apparent. After the case for the prosecution, which extended over four days' hearing at the Old Bailey, a plea of not guilty was withdrawn, and Clarence Hatry and three companions were sentenced by Mr. Justice Avory to varying terms of penal servitude—the punishment awarded Hatry being the maximum penalty for forgery.

The wrongdoing consisted of what the Judge described as "the most appalling frauds that have ever disfigured the commercial reputation of this country," carried out "by means of wholesale forgeries of spurious securities in trustee stocks which neither banker nor broker, nor any member of the public, would ever dream of suspecting to be otherwise than genuine." The group were negotiating for a huge scheme of amalgamation, in connection with which vast sums of money were required—only temporarily, it was imagined; and it was, in the first instance, to provide this money that the illegal acts were resorted to. Three British Corporations for whom Hatry's Companies had been engaged in raising loans have had withheld from them over £800,000, while persons to whom the forged certificates were uttered have lost nearly as large a sum. Then there was, of course, the series of interlinked Companies, by which financial schemes of the kind on hand appear to be so greatly facilitated. When things began to go wrong, these became a source of weakness, instead of strength, and in the endeavour to support falling share values matters went from bad to worse. In most cases, the shareholders in these Companies must have lost all that they put into them.

The gleam of hope in a drab case of this kind is that its lessons may be heeded. For Hatry there is the lesson

that every act has its consequence; while the terrible punishment meted out to him should prove a deterrent to any who may in time to come feel tempted to follow his example. Many of those who were victimized were financial experts who may be trusted to do all they can to obviate a repetition of such disastrous transactions; and the remainder were shareholders who have once more had their faith shaken. From the point of view of the City, the latter is, perhaps, the more serious aspect of this sorry affair.

Economic Advisory Council.

An Economic Advisory Council is to be set up, under the Chairmanship of the Prime Minister; and it is hoped to secure for it the whole-time services of two experienced economists. It will be a body similar in character to the Committee of Imperial Defence, and the idea is that it should absorb the functions of the Civil Research Committee.

Specifications for Benzole, &c.

We have already stated that the National Benzole Association are enjoying an exceptionally large demand for the "Standard Specifications for Benzole and Allied Products, 1929," which was the subject of a review by Dr. W. B. Davidson in our last issue. As we understand that the book is the first comprehensive attempt that has been made in this country to formulate a complete series of the specifications for the allied oil products of coal tar, its success is well deserved.

A New Terror?

Only a week or two ago we were bemoaning the fact that to-day a quiet stroll is liable to be interrupted by the blatancy of more or less perfect sound-producing instruments. Is the eye now to be assailed in an equally aggressive manner in the same desire to secure publicity? We know not; but at any rate the following note on "Kerbstone Advertising in Paris" is culled from our contemporary the "Electrical Review:" "A new style of publicity device is to be experimented with in Paris. This consists of a thick pane of glass let into the pavement of the streets, with a mirror underneath. At night electric lamps shining on the mirror will cause the reflection of an advertisement to appear on the glass, while in bright sunlight a similar effect will be produced. Advertisers will be able to rent space."

The "Chelsea Three."

Not for a long time have we come across so ingenious a mechanical device as is incorporated in a new meter (under the name of the "Chelsea Three") marketed by Messrs. George Glover & Co., Ltd. It overcomes once and for all the "lack-of-pennies" handicap by giving the consumer the marvellously convenient selection of 1s., 6d., or 1d.—whichever he finds most suitable at any particular moment. At the same time, it helps the supplier in obviating much of the transport cost of bulky and weighty copper coinage. In a descriptive article in this issue of the "JOURNAL" we deal with the manner in which this new meter safeguards the gas undertaking and the consumer, besides aiding the storekeeper. One safeguard is most interesting. Suppose the housewife inserted a coin in the meter, and, before she had time to turn the handle on the spindle, thus opening the gas valve, she was called away. It is quite possible for her to forget on returning that she had inserted a coin, and she might endeavour to insert another. It is, however, impossible for her to insert another coin until the handle has been rotated and the coin already engaged has performed its destined function and has been ejected into the cash-box.

Coke Ovens for Gas Manufacture.

An extract from a paper by Mr. L. H. Sensicle before the Coke Oven Managers' Association (Northern Section) will be found in our columns to-day. In this contribution, the author states that, if the owners are iron and steel manufacturers, then the coking plant should be situated near the blast furnaces and steelworks; colliery owners, he suggests, would be best served by ovens situated centrally among a group of collieries supplying coking coal; the disposition of ovens for large gas concerns is obviously at the usual manufacturing site; while independent coke manufacturers will choose a site near large towns where domestic markets are in existence or surplus gas can be taken by the statutory distributors. Mr. Sensicle makes out a good case for the Collin oven for gas supply; the results from such plant, he says, are better than from average horizontal retort installations. The author lays particular stress on the advantages of the Collin dry coke cooling method. Assuming a battery with a throughput of 1000 tons of coal a day, he calculates that, if all the steam from the coke cooling plant were used for power generation, there would be enough power for the needs of the whole bye-product coking installation. The opinion is expressed that "it would seem inevitable that dry cooling methods will become standard practice in the coking industry."

Forthcoming Engagements.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Jan. 30.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in Birmingham. Paper by Mr. C. Featherstone Hammond, of Messrs. Submerged Combustion, Ltd., on "Submerged Combustion."

Jan. 31.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. G. Percival on "Horizontal Retorts."

Feb. 1.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Works of the Stourbridge Refractories Co., Ltd., Stourbridge.

Feb. 5.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to Cement Works of Messrs. G. & T. Earle, Ltd., Hope, Derbyshire. Paper by Mr. H. Platt, M.I.Struct.E. (Bolton), "Some Features of Concretes for Gas-Works Requirements."

Feb. 8.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to Messrs. James Keith & Blackman Co., Ltd., and the Gas-Works, Arbroath.

Feb. 8.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Annual Social. Address by Mr. H. E. Copp, M.Inst.C.E., Vice-President of the Institution of Gas Engineers.

Feb. 10.—MIDLAND ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual Dinner and Dance at the Grand Hotel, Birmingham.

Feb. 11.—FEDERATION OF GAS EMPLOYERS.—Quarterly meeting of Central Committee, 28, Grosvenor Gardens, S.W. 1.

Feb. 11.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board.

Feb. 11.—INSTITUTION OF GAS ENGINEERS.—Meeting of Gas Education Executive Committee, 4 p.m.

Feb. 12.—INSTITUTION OF GAS ENGINEERS.—Meetings of Executive Committee, 10 a.m.; Finance Committee, 12 noon; Benevolent Fund Committee of Management, 12.20 p.m.; Council, 2 p.m.

Feb. 14.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Annual Dinner and Concert, Holborn Restaurant, W.C. 1.

Feb. 14.—WESTERN JUNIOR GAS ASSOCIATION.—Visit to the Exeter Gas-Works.

Feb. 15.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Cardiff. Paper by W. H. Evans on "Propositions in Gas Fitting."

Feb. 20.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in the Council House, Birmingham. Paper by Mr. C. E. Holt on "Boosting Pressures for Outlying Districts."

Feb. 22.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the Greenock Gas-Works.

Feb. 22.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting in Bradford. Paper by Mr. B. Thorpe (Huddersfield).

Feb. 28.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Dr. S. Pexton on "The Water Content in Tar."

March 6.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council meeting in the afternoon.

June 2-5.—INSTITUTION OF GAS ENGINEERS.—Annual Conference in Leeds.

Personal.

Mr. S. E. WHITEHEAD, B.Sc. (Eng.), A.M.I.Mech.E., has been appointed Engineer of the Southampton Gaslight and Coke Company in succession to Mr. F. Durkin, who retired recently. For the past eleven years Mr. Whitehead has been Assistant Engineer to the Portsmouth Gas Company. He received his training in the City of Birmingham Gas Department, afterwards spending two years as Draughtsman, Chemist, and Assistant at Southport, and four years in the Gas Section, Department of Explosives Supply.

Mr. P. G. G. MOON, Engineer and General Manager of the Bournemouth Gas and Water Company, has been elected a Member of the Institution of Civil Engineers; and Mr. STEPHEN LACEY, B.Sc., Distribution Engineer to the Gas Light and Coke Company, has been transferred from the Class of Associate Member to that of Member.

The Directors of the South Metropolitan Gas Company have appointed Mr. THOMAS BROWN to fill the position of Rental Superintendent. Mr. Brown was educated at Westminster City School and at the University of Birmingham, where he obtained the degree of Bachelor of Commerce, and was Gladstone Memorial Prizeman. For the past six years he has been Assistant General Secretary to the Iron and Steel Trades Employers' Association.

Mr. G. B. HOWARTH, M.C., M.Sc., Gas Engineering (Leeds), A.I.C., has been appointed Chief Chemist to the Newcastle-upon-Tyne and Gateshead Gas Company, and will consequently resign his position as Senior Research Assistant on the staff of the Joint Research Committee of the Institution of Gas Engineers and the University of Leeds. Mr. Howarth went with a Leeds City Scholarship from the Boys' Modern School to the University, and entered on the Degree Course in Gas Engineering. His course was interrupted by the war, during the whole period of which he served in the Army, attaining the rank of Captain and receiving the Military Cross. Returning to the University near the end of 1918, he took a 1st Class Honours Degree in Gas Engineering, and was awarded a University Scholarship in 1920. Since that time Mr. Howarth has had varied research experience on the works and in the laboratory at Birmingham and Leeds, dealing with blue and carburetted water gas plant, waste-heat boilers, aeration of burners, and the products of combustion from gas appliances.

Prior to their marriage, which took place on Saturday last at Streatham, Mr. WALTER T. DUNN, M.I.Mech.E., F.C.I.S., and Miss FLORENCE PRICE arranged a delightful dinner party, at which a number of their oldest friends had an opportunity of congratulating them, and of wishing them every happiness. The rendezvous was the National Liberal Club, where last Thursday evening a party of some fifty ladies and gentlemen sat down under the Chairmanship of Mr. Dunn, with Miss Price in the Vice-Chair. A first-rate programme of music was interspersed with speeches, during which the replies to an omnibus toast proposed by Mr. Dunn afforded an opportunity of which the speakers gladly availed themselves for many warm tributes to both host and hostess, which their friends knew to be thoroughly well deserved. Mr. and Mrs. Dunn start their married life with every kind wish from all connected with the industry to which Mr. Dunn has devoted so many years of loyal and zealous service.

Mr. LOUIS PENNY, M.Inst.C.E., of Cranfield, East Grinstead, Sussex, late Engineer, Manager, and Director of the Bombay Gas Company, who died on Dec. 14, aged 87, left £34,806, with net personalty £30,713.

Obituary.

J. G. W. ALDRIDGE.

The death occurred on Jan. 18, at his residence in Wimbledon, after a short illness, of Mr. J. G. W. Aldridge, Chairman and Governing Director of Aldridge & Ranken, Ltd., of London and Bath.

Mr. Aldridge, who was the son of Mr. James Aldridge, of Southampton, was born in 1856, and was educated at the Rev. W. H. Bower's Preparatory School, Hythe, the Southampton Grammar School, and the Crystal Palace Engineering School. He was articled to the late Mr. Charles Turner, M.Inst.C.E. (a pupil of Brunel), after which he was for some time Assistant to the Borough Surveyor of Southampton, and then joined the staff of the Marine Department of the South Western Railway Company.

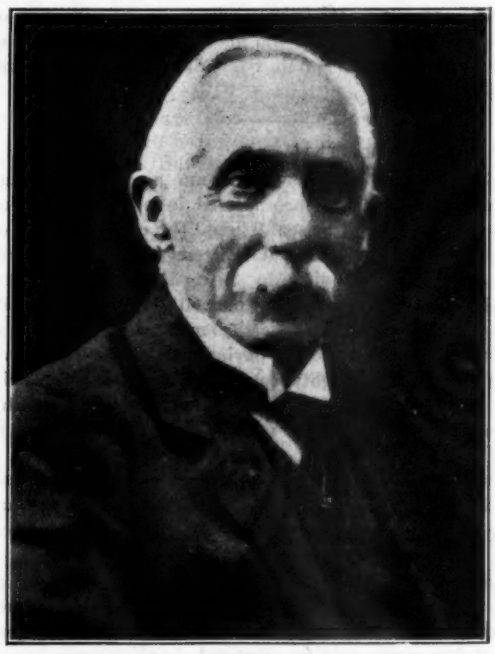
He commenced practice in Southampton, in 1889, as a Consulting Engineer, and later transferred his practice to London, retaining his connection with the South Western Railway Company as Consulting Electrical Engineer, having carried out the electrical equipment of the Docks, and having had sole charge of their maintenance for the first twelve years after the Railway Company took possession. He was also Consulting Electrical Engineer to the Southampton Harbour Board, the Tees Conservancy Commissioners, the Midland and South Western Junction Railway, the Southampton, Ryde, Smethwick, and other Lighting and Power Corporations, and advised the Newport Dock Authorities and other public bodies concerning electrical equipment. He designed and built the first electric jib crane erected in England, and has been largely interested in electric cranes both at home and abroad.

He became an Associate Member of the Institution of Civil Engineers in 1883, and was the author of papers read before the British Association on the electrical equipment of harbours, docks, tramways, and motor omnibuses. In 1898 he was joined in partnership by Mr. A. W. Ranken, Assoc.M.Inst.C.E., M.I.E.E., formerly Chief Electrical Engineer to the Corporation of Great Yarmouth; the firm practising as Aldridge & Ranken.

In 1902 he met the late Mr. W. W. Fiddes, of Bristol, and was associated with him in the invention and improvement of the Fiddes-Aldridge simultaneous retort charging machine, now so well known, which commenced a new era in the charging of gas retorts; this being the first machine to charge and discharge retorts simultaneously, and enable the work to be carried out with a tremendous saving in time.

Another improvement with which he was associated was the Aldridge & Gibson patent hopper door, which enables a charge of coal automatically to be taken by the stoking machine from the overhead hoppers while travelling from one retort to another, and so in this way effects a further considerable saving in time.

Some time afterwards Mr. Aldridge commenced negotiations with Mr. Congdon, of the Atlanta Gas Company, Georgia, U.S.A., the inventor of the scrubber standpipe system which bears his name. The result of this was that Mr. Aldridge subsequently obtained the sole licence for this patent for the United Kingdom and the Continent, which again introduced new features in retort house mthods, one of which included the absence of the continual and often very laborious augering of ascension pipes, and cleaner and better working conditions for the men employed in the retort house. Mr. Aldridge has, therefore,



The Late Mr. J. G. W. Aldridge.

obviously done much towards the modernizing of horizontal retort house practice.

Together with these improvements he developed the coal and coke handling side of the business. On its being formed into a Company in 1922, Mr. Aldridge became Chairman and Governing Director, and was actively engaged in the Company's business until a few days before his death.

An Appreciation by One who Knew Mr. Aldridge.

Mr. Aldridge was one of those (unfortunately rare) personalities who endeared himself to all who came into contact with him, whether in private or in business life. His morals were of a high standard, and an inspiration to anyone who had the pleasure to work with him or for him. His wonderful foresight and genius for knowing what other people wanted is exemplified by the success of his firm's manufactures. His many friends will cherish the memory of a noble-hearted English gentleman. The gas industry has lost a pioneer of horizontal retort machinery.

The death occurred on Jan. 21 of Mr. WALTER STANLEY SOWERBUTTS, Gas Engineer and Manager to the Stockport Corporation, in his 45th year. Deceased had been in the service of the Stockport Gas Department for over 28 years, starting as an articled clerk in 1901 under the then Gas Engineer (Mr. S. Meunier), whose death in October, 1928, left Mr. Sowerbutts, as his Chief Assistant, in charge of his duties. Always keenly interested in his profession, and seizing every opportunity of keeping himself abreast of all developments, Mr. Sowerbutts stood high in the estimation of Mr. Meunier, and the Gas Department felt no hesitation in nominating him for the post of Gas Engineer—and the Town Council very cordially ratified the appointment at their first monthly meeting last year, a warm tribute being paid to Mr. Sowerbutts' loyalty and efficiency by Sir Thomas Rowbotham, the Chairman of the Gas Committee. For some years now the Gas Department has been engaged in a forward policy which has involved the carrying-out of important developments and alterations. In connection with this work Mr. Sowerbutts shouldered a full share of work and responsibility; and it is a matter for extreme regret that he has not been spared to see the completion of schemes in which he had such a sense of professional pride and satisfaction.

The oldest gas official in Ireland has passed away in his 94th year in the person of Mr. JAS. NISBET, who for the long period of 46 years was connected with the Portadown Gas Company, 25 years of which was in the position of Manager. Mr. Nisbet, who was a native of Scotland, went to Portadown in 1884 from Bandon (Co. Cork) to take up the Managership. On retiring from that position, being still a very active man, he accepted the appointment of gas collector, the duties of which office he continued to discharge with efficiency up to a month ago when he was laid aside for the first time in his long life. In Mr. Nisbet's early days all the plant was operated practically by hand, and he lived to see the most remarkable changes in the evolution of the industry. He was succeeded 21 years ago by the present Manager at Portadown, Mr. Wm. Pettigrew, who went there from Derry.

As we are going to press we learn that Mr. E. H. HORSTMANN passed away very suddenly in the early hours of the morning of Monday, Jan. 27.

Correspondence.

[We are not responsible for opinions expressed by Correspondents.]

The Lincoln Appointment.

SIR,—At a meeting of the Committee of the Manchester District Institution of Gas Engineers held on Friday last, Jan. 24, attention was drawn to the advertisement recently appearing in your paper, for an Engineer and Manager for the Lincoln Corporation Gas Undertaking. After discussion, the following resolution was passed:

> That this Committee of the Manchester District Institution of Gas Engineers is of opinion the salary offered by the Lincoln Corporation for the position of Gas Engineer and Manager is inadequate remuneration for the services of an official qualified to take charge of the Gas Undertaking, and must ultimately tend to discourage the official appointed, resulting in inefficiency to the detriment of the Undertaking; and, also, that a letter be sent to the Secretary of the Chartered Institution of Gas Engineers, requesting the Council to make immediate representation to the Lincoln Corporation, drawing attention to the foregoing, and quoting the salaries which are paid to qualified gas engineers by gas undertakings of similar capacity.

J. BRIDGE,
Hon. Secretary.

Gas-Works, Elland,
Jan. 27, 1930.

Liquid Purification by Soda Ash Solution.

SIR,—Your issue for Jan. 15 contains an article by Mr. W. J. G. Davey on "Liquid Purification by Soda Ash Solution." On p. 158 the author refers to the possibility of disposal of hydrogen sulphide from the actifier by combustion beneath the boilers.

I desire to point out that such a method of disposal would be a retrograde step as regards improvement of atmospheric conditions, and that the proposal does not meet with the approval of the Alkali, &c., Works Inspection Department.

W. A. DAMON,
Chief Inspector of Alkali, &c., Works.

Cornwall House, Stamford Street, S.E. 1.
Jan. 22, 1930.

Clean Coal for the Gas Industry.

SIR,—I should like to make a point in connection with the production of clean coal arising out of your report of Dr. Lessing's paper on "Coal Cleaning in Modern Times" in your issue for Jan. 15. In your leader on "Ash and Ashes" you draw attention to the great advantages of a coke containing only 5 p.ct. of ash. Dr. Lessing describes one way in which coal could be cleaned to ensure this, but his calculations on the cost are made from the point of view of the washery constructor rather than of the coal producer. Dr. Lessing considers that "you can clean a ton of . . . coal . . . containing 15 to 20 p.ct. of ash—and get every ounce of truly clean coal out of it at the rate of 8d. per ton of coal, including capital charges." Dr. Lessing does not, however, mention the cost of the loss of vendible coal, which is the most serious to the coal producer. This can be made clear by an example of the float and sink analysis of a typical Durham gas coal.

Sp. Gr.	Weight P.Ct.	Ash P.Ct.	
Floats 1·35	76·7	2·4	83·4 p.ct. with 3·0 p.ct. ash
,, 1·40	6·7	9·9	
,, 1·50	5·7	16·1	16·6 ,, ,, 45·5 ,, ,,
,, 1·60	2·1	26·2	
Sinks 1·60	8·8	68·8	
Total . .	100·0	10·0	

By Dr. Lessing's process using calcium chloride, the greatest specific gravity obtainable is 1·40. The cleaning of this coal (originally containing 10 p.ct. of ash) at 1·4 sp. gr. would give 83·4 p.ct. of clean coal with 3 p.ct. of ash and 16·6 p.ct. of refuse with 45·5 p.ct. of ash. But, instead of having 100 tons of 10 p.ct. ash coal to sell, the coal producer would only have 83·4 tons of 3 p.ct. ash coal; or, for each 1 p.ct. of reduction in ash, there has been nearly 2½ p.ct. loss of "saleable coal." If the delivered price of the 10 p.ct. ash coal were 20s., the coal producer would require $\frac{20s.}{0\,834}$ = 24s., *plus* the cost of washing (say, 8d.). Taking Dr. Lessing's figure of 26s. per ton for coal at the retort house, with 10 p.ct. of ash, the clean coal of 3 p.ct. of ash would cost $\frac{26s.}{0{\cdot}834}$ + 8d. = 31s. (*plus* 8d.).

There is no doubt that clean coal is most desirable in the gas as in other industries, but the gas producer should realize what it will cost him *without the coal producer obtaining any further profit.* Put briefly, the capital and labour costs of washing may be only 6d. per ton, but, in addition, the increased cost to compensate for loss of vendible coal will be roughly 2½ p.ct. on the original selling price of the coal for each 1 p.ct. of ash reduction.

R. A. MOTT.

Department of Fuel Technology,
University of Sheffield, Jan. 25, 1930.

Board of Trade Gas Undertakings Return for 1928.

PART II.—FINANCE AND PRICES.

The second part—finance and prices—of the Return for the year 1928 relating to all Authorized Gas Undertakings in Great Britain has been issued by H.M. Stationery Office (Adastral House, Kingsway, London, W.C. 2, and Branches), at the price of 10s. 6d. net, postage extra. Part I. (which was reviewed in the "JOURNAL" for Aug. 28 last) dealt with manufacture and supply.

There are dealt with in this part of the Return 774 undertakings, which is the same number as was included in Part I.

The particulars as to prices charged are, unless otherwise indicated, for Dec. 31, 1928, for English and Welsh undertakings, and May 15, 1928, for Scottish ones. The other information given in the Return relates (except where otherwise noted) to the calendar year 1928 in the case of companies' undertakings, and, for local authorities, to the year ended March 31, 1929, for concerns in England and Wales, and the year ended May 15, 1928, for those in Scotland.

The differences in these periods, especially in the case of Scottish local authority undertakings, must be borne in mind when considering the comparative tables—*e.g.*, having regard to the period covered by the coal stoppage of 1926, the net profit of £1,571,577 obtained by local authorities in England and Wales during the year ended March 31, 1928, when combined in the comparative table with the deficit of £1,125,524 incurred by the Scottish local authorities during the year ended May 15, 1927, shows a net profit for all local authority undertakings of only £446,053.

CAPITAL INVESTED.

The total nominal capital invested in the undertakings dealt with in the Return is £189,449,857 (including loans borrowed by local authorities and since repaid), an increase of £6,044,536 over the amount shown in the previous Return. The receipts of the undertakings on revenue account (£68,258,556) show a decrease of £6,571,751 over the previous year's total, but the expenditure (£56,271,028) shows a decrease of £7,341,820, the gross profit being increased by £770,069.

Comparative tables in the Return, which are reproduced below, set out separately the financial results for the companies' undertakings and those belonging to local authorities for the whole of Great Britain—in the former case for the years 1920 to 1928, and in the latter for the financial years 1920-21 to 1928-29.

COMPANIES.

In connection with the companies, the figures in the body of the Return for 1928 are further split-up as follows:

England and Wales.—Total capital authorized, £104,260,874; capital and premiums paid-up, £89,512,447; loan capital authorized, £44,704,959; loan capital issued, £29,014,947; revenue account receipts, £44,931,787; expenditure £37,910,106; profit, £7,024,925 (loss, £3244).

Scotland.—Total capital authorized, £310,656; capital paid-up, £259,058; loan capital authorized, £123,491; loan capital issued, £72,759; revenue account receipts, £144,594; expenditure, £103,254; profit, £41,340.

LOCAL AUTHORITIES.

The corresponding figures in the Return for the local authorities for 1928-29 are divided-up thus:

England and Wales.—Total amount of loans authorized, £58,725,417; money borrowed, £55,399,114; loans repaid and balance left in sinking fund, £31,132,321; revenue receipts, £17,803,409; expenditure, £14,453,794; gross profit, £3,351,390 (loss, £1775); interest paid on loans, loans repaid, and amounts placed to sinking fund during the year, £2,680,935; net profit, £668,680.

Scotland.—Total amount of loans authorized, £17,021,367; money borrowed, £15,191,532; loans repaid and balance in sinking fund, £7,749,071; revenue account receipts, £5,378,766; expenditure, £3,803,874; gross profit, £1,576,129; loss, £1237; interest paid on loans, amount of loans repaid, and amounts placed to sinking fund during the year, £788,513; net profit, £812,361; loss, £25,982.

In addition to the columns shown in the tables reproduced, the Return gives information as to the Special Acts of Parliament and Orders relating to each undertaking, as well as the maximum or standard price of gas per therm, or per 1000 c.ft., as the case may be, and the actual prices charged to prepayment consumers, to ordinary consumers, for power, &c., and for public lamps. There is also a column showing the scale of annual charges for meter rent to private consumers.

COMPARATIVE TABLES.

Companies' Undertakings.

Year.	Number of Authorized Undertakings included in Return.	Total Capital (Share and Stock).		Total Loan Capital, including Debenture Stock.		Revenue Account.		
		Authorized.	Paid-up.	Authorized.	Issued.	Receipts.	Expenditure.	Profit.
		£	£	£	£	£	£	£
1920 . . .	494	98,469,716	82,065,243	29,109,279	18,418,665	53,714,841	49,566,608	4,148,233
1921 . . .	488	99,422,967	83,063,256	32,357,024	21,104,283	51,870,058	47,588,176	4,281,882
1922 . . .	481	100,437,430	83,793,973	33,751,958	22,011,223	46,541,952	39,785,069	6,756,883
1923 . . .	475	100,374,599	84,561,849	33,957,362	22,035,911	44,226,797	37,839,199	6,387,598
1924 . . .	467	100,553,738	85,537,819	34,581,299	22,544,907	44,293,709	38,756,098	5,537,611
1925 . . .	465	100,871,912	86,557,396	33,146,038	22,778,217	43,931,719	38,098,485	5,833,234
1926 . . .	463	101,398,265	87,657,953	41,115,715	25,370,284	48,972,181	43,811,615	5,160,566
1927 . . .	462	102,465,371	88,581,757	42,478,258	26,135,262	49,885,851	42,574,960	7,310,891
1928 . . .	455	104,571,530	89,771,505	44,828,450	29,087,706	45,076,381	38,013,360	7,063,021

Local Authorities' Undertakings.

Year.	Number of Authorized Undertakings included in Return.	Total Amount of Loans Authorized.	Total Amount of Money Borrowed.	Total Amount of Loans Repaid, and Balance in Sinking Fund.	Revenue Account.			Interest paid on Loans, Amount of Loans Repaid, and Amount placed to Sinking Fund during Year.	Net Profit or *Deficit*.
					Receipts.	Expenditure.	Gross Profit.		
		£	£	£	£	£	£	£	£
1920-21 .	304	52,823,504	48,916,008	25,076,806	27,244,570	24,535,685	2,708,885	2,269,573	439,312 profit
1921-22 .	309	60,767,887	53,770,157	26,725,430	26,569,144	25,061,731	1,507,413	2,610,228	*1,102,815 deficit*
1922-23 .	316	64,519,579	57,123,829	28,016,471	24,084,699	19,414,366	4,670,333	2,901,500	1,768,833 profit
1923-24 .	310	65,533,169	58,612,494	30,027,099	23,349,561	18,754,701	4,594,860	2,965,295	1,629,565 profit
1924-25 .	315	67,625,057	60,323,048	31,746,240	22,416,281	19,131,529	3,284,752	3,026,677	258,075 profit
1925-26 .	317	69,392,637	62,652,376	33,426,330	22,110,924	18,810,163	3,300,761	3,053,909	246,852 profit
1926-27 .	319	72,432,893	65,996,664	35,070,757	25,729,687	23,161,132	2,568,555	3,210,529	*641,974 deficit*
1927-28 .	320	74,431,800	68,688,302	37,330,482	24,944,456	21,037,888	3,906,568	3,460,515	446,053 profit
1928-29 .	319	75,746,784	70,590,646	38,881,392	23,182,175	18,257,668	4,924,507	3,469,448	1,455,059 profit

In To-Day's "Journal."

Reduction of Gas Volumes to N.T.P.

Dr. Guy Barr, of the National Physical Laboratory, gives a nomogram for the reduction of gas volumes to normal temperature and pressure.

* * * *

Liquid Purification by Soda Ash Solution.

Our issue for Jan. 15 contained an article by Mr. W. J. G. Davey on this subject, in which the author referred to the possibility of disposal of hydrogen sulphide from the actifier by combustion beneath boilers. To-day, in our correspondence columns, Mr. W. A. Damon, Chief Inspector of Alkali, &c., Works, states that such a method of disposal would be a retrograde step as regards improvement of atmospheric conditions, and that the proposal does not meet with the approval of the Alkali, &c., Works Inspection Department.

* * * *

Coke Ovens for Gas Supply.

This subject is discussed by Mr. L. H. Sensicle, who makes out a good case for the Collin compound oven, and speaks of the advantages of the Collin dry coke cooling system.

* * * *

The "Chelsea Three."

A new type of meter, manufactured by Messrs. George Glover & Co., Ltd., which gives the consumer the convenient selection of 1s., 6d., or 1d.—whichever he finds most suitable at any particular moment—is described and illustrated.

Board of Trade Return for 1928.

The second part—finance and prices—of the Return for the year 1928 relating to all authorized gas undertakings in Great Britain has been issued by H.M. Stationery Office, and is reviewed.

* * * *

Recovery of Ammonia.

Dr. A. Parker replies to the discussion of the Second Report of the Ammonia Sub-Committee of the Institution of Gas Engineers, presented at the meeting of the Institution on Nov. 14, 1929.

* * * *

Another Amalgamation.

An agreement is to be considered shortly for amalgamation of the Kingston-upon-Thames Gas Company with the Wandsworth, Wimbledon, and Epsom District Gas Company.

* * * *

Utilization of Coal-Tar Crudes.

One of the chief obstacles to the production of vat dyes derived from anthraquinone has been the difficulty of obtaining high-grade anthracene from the crude material; and in a paper before the Second International Conference on Bituminous Coal, A. O. Jaeger explained that a specific separating solvent for anthracene has been found in furfural. By dissolving crude anthracene in furfural at elevated temperatures, and cooling the liquid, anthracene of excellent quality for direct vapour-phase oxidation to anthraquinone separates out. The solvent may be recovered and the losses of both solvent and solute are slight.

Topical Items.

Society of British Gas Industries.

Council Meeting.

A Meeting of the Council was held at 56, Victoria Street, Westminster, S.W., on Thursday, Jan. 16—Mr. C. A. GOODALL, the Chairman, presiding.

Those present were Mr. Frank West (Vice-Chairman), Dr. E. W. Smith (Hon. Treasurer), Col. E. A. Wilson, Major R. Miles, Messrs. R. J. Milbourne, G. J. Jackson, C. R. F. Threlfall, H. E. Bennet, D. M. Gibb, G. Clark, F. J. Gould, B. B. Waller, R. B. Hodgson, G. Ewart, E. J. Davison (Hon. Secretary), and Arthur L. Griffith (Secretary).

Apologies for absence were reported from Messrs. J. W. Scott, A. B. Balmford, F. C. Tilley, S. Cutler, E. J. Fox, and W. J. D. Howell.

The CHAIRMAN referred with regret to the death of the following members:

Mr. H. S. Knight, General Manager, R. & J. Dempster, Ltd.,

Col. Arthur Bray, Chairman, George Bray & Co., Ltd.,

Mr. Victor Falk, Director, Falk, Stadelmann, & Co., Ltd.,

and reported that letters of sympathy had been sent. The members rose in their places as a mark of respect.

A donation of two guineas was voted to the Commercial Education Department of the London Chamber of Commerce.

In regard to the new Australian tariff a letter was submitted from the Federation of British Industries, and the following resolution was unanimously passed:

> The Council of the Society of British Gas Industries notes with profound regret the recent heavy increases in the Australian tariff, which will have a twofold adverse effect upon the reciprocal trade between Great Britain and Australia, which is so important to both parties. First, by impeding the sale of British goods in Australia to the detriment of the British manufacturer, and with the further effect of rendering this country less capable of purchasing Australian products; and secondly, by still further increasing the economic difficulties of Australia, thus rendering it more difficult for her to obtain as freely as in the past the necessary financial means for her development. The Council considers, moreover, that the resulting conditions in Australia—namely, high cost of living, difficulties in finance, and high production costs—will in future discourage British manufacturers from establishing industries in the Commonwealth.

Matters in connection with the Gas Industries Section at the British Industries Fair, Birmingham, were reported, the arrangements being well advanced. It was decided that the Society should take a space and arrange details.

The Chairman reported that Sir Arthur Duckham would take the Chair at the Joint Gas Conference on Feb. 18, when Mr. F. J. Gould would read a paper on "Gas Lighting."

It was reported that the Society was co-operating with the Institution of Gas Engineers in the formation of a Gas Industry Committee of the British Engineering Standards Association.

Proposed Amalgamation of Wandsworth and Kingston-upon-Thames Gas Companies.

A meeting of the Wandsworth, Wimbledon, and Epsom District Gas Company is to be held on Feb. 11 to consider an agreement for amalgamation with the Kingston-upon-Thames Gas Company.

A circular issued to shareholders states that every holder of £100 consolidated ordinary stock of the Kingston Company will receive £50 of consolidated stock and £80 of 5 p.ct. preference stock of the Wandsworth Company. All moneys due by the Kingston Company on mortgage bonds and the debenture stock created and issued by the Wandsworth Company are to be charged on the amalgamated undertaking.

Two of the Kingston Directors may join the acquiring Company, and each not joining will receive as compensation for loss of office a sum equal to seven times that received in respect of fees as Director during 1929, inclusive of income-tax. The Engineer and Manager, the Secretary, and the Auditors will also receive compensation.

The area of supply of the Kingston Company, which adjoins the Wimbledon limits for some miles, and also adjoins the Wandsworth limits and the Epsom limits of the Wandsworth Company, includes Kingston-upon-Thames, Surbiton, Esher and The Dittons, Maldens and Coombe, and part of Cuddington not already within the limits of supply of the Wandsworth Company. Considerable building development is taking place in the area of the Kingston Company, and the annual sales of gas show substantial increases.

The total paid-up share capital of the Kingston Company consists of £282,500 consolidated ordinary stock, in respect of which premiums amounting to £11,328 have been received.

The Company have created 4 p.ct. debenture stock to an amount of £31,400, and there are mortgages outstanding also carrying interest at 4 p.ct. and amounting to £13,050.

The total make of gas of the Kingston Company during the year 1929 was 1003 million c.ft., which, on a total capital expenditure of £338,563, is less than £338 per million c.ft. of gas made, which is a low capitalization.

A British Source of Supply of Methane Gas.

The attention which is now being devoted to research on the use of petroleum products as chemical raw materials and the realization of the reactivity of the paraffins under suitable experimental conditions has evoked a distinct demand for supplies of materials for the work of investigation. The use of pure materials, wherever possible, renders the task of the research chemist much easier, and his control of the variables in the operation much more certain, than when mixtures of homologous compounds are employed. In this connection it is rather interesting to know, states the "Chemical Trades Journal," that there exists a British supply of practically pure methane. The material is available from Insoles, Ltd., the colliery proprietors of Cymmer, Porth.

So far as we can gather, the writer adds, this is the only colliery in the country where the natural coal gas exudes from the strata in an undiluted quality. A representative analysis shows 97·19 p.ct. of combustible gas (which is practically all methane), 0·67 p.ct. of carbon dioxide, and (by difference) 2·14 p.ct. of nitrogen. The purity of this gas has made it very valuable for experimental purposes, as it has repeatedly been found that ordinary coal gas, though approximating in analysis to the above figures, gives very different results where accurate measurements and reliable ascertainments are necessary, especially in connection with flame-proof apparatus and the explosibility of different coal dusts. The gas is already used extensively at home and abroad at testing stations where research work is carried out in the investigations referred to, together with the testing of flame safety lamps and electrical lamps, &c.

The history of its occurrence in the pit shaft from which it is obtained and the subsequent regular flow of the gas is somewhat interesting. One Sunday morning, about fifty years ago, the pitman was in the shaft about 300 yards from the surface when suddenly he smelt a strong flow of firedamp in the ventilating current. Investigation showed that a strong blower was exuding from the strata. The blower was properly walled in. It is led to the surface through a 2-in. pipe and has continued to flow continuously ever since at the rate of 800 c.ft. of free gas per hour.

The suggestion is made as to the possibility of utilizing the gas *in situ* for the manufacture of methyl alcohol, or of formaldehyde. The most suitable conditions for the catalytic oxidation of methane gas have now been well enough established, so that it is well within the bounds of possibility that the future will see the establishment in South Wales of a chemical manufacturing industry based on the natural gas supplies as its raw material.

South Metropolitan Gas Company.—Subject to audit, the Directors of the South Metropolitan Gas Company recommend a final dividend for the past year on the ordinary stock at the rate of 6¼ p.ct. per annum, *less* the interim dividend of 2¾ p.ct. paid in September last.

Co-operative Coal Hydrogenation in Germany.—A Company with the title of "Ruhr Montanindustrie A.-G.," with headquarters in Essen and with an original capital of 12 million marks, was formed recently by the majority of the mines in the Ruhr colliery district. One of the main objects of the new concern is to erect plant for the co-operative carrying out of coal hydrogenation and similar processes.

Rebate on Gas Bills at Oswestry.—The Directors of the Oswestry Gas Company announce that, as the new plant is now working efficiently, and as they recognized that during the transition period the gas supplied was not of the usual quality, a special rebate will be allowed of 10 p.ct. Oswestry's gas is 5s. per 1000 c.ft., and ordinarily 7½ p.ct. discount is allowed for prompt payment, so that this quarter consumers will have 17½ p.ct. discount.

Commercial Gas Company.—The Directors of the Commercial Gas Company will recommend at the Annual General Meeting to be held on Feb. 13 the payment of a final dividend on the ordinary stock of the Company at the rate of 7 p.ct. per annum, *less* income-tax, for the half-year ended December, 1929, making, with the interim dividend paid at the rate of 5 p.ct. per annum, *less* income-tax, for the June half-year, 6 p.ct. for the year.

Midland Association Dinner.—Readers will have noticed from the announcement in our "Forthcoming Engagements" that the annual dinner of the Midland Association of Gas Engineers and Managers will take place at the Grand Hotel, Birmingham, on Monday, Feb. 10, at 6.30. Previous similar functions have been a pronounced success, and members are greatly looking forward to this year's dinner. Tickets and further details may be obtained from the Hon. Secretary, Mr. Arthur Roberts, Gas-Works, Hereford.

Stove Company's Extensions at Luton.—Plans for the extensions of the Davis Gas Stove Company's works at Dallow Road, Luton, have been passed by the Luton Town Council.

Reduction for Gas Engines at Hinckley.—The Hinckley Urban Council have decided to reduce the price of gas for engines in the Barwell and Earl Shilton districts to 3s. per 1000 c.ft.

Proposed Extensions at Chorley.—The increased consumption of gas at Chorley during the last few years has been so considerable that extensions to the gas-works are being effected to meet the higher demand. The cost will be defrayed out of the gas-works revenue.

Gas Heating in Cardiff Hall.—On the occasion of the recent Territorial Army Officers' Ball, held in the Drill Hall, Cardiff, the heating of the Hall and the adjoining supper room was entrusted to the Cardiff Gas Light and Coke Company, and was carried out by means of gas radiators, thermostatically controlled.

The Gas Light and Coke Company.—The accounts of this Company for the past year show that the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4 p.ct. consolidated preference stock, at the rate of £4 p.ct. per annum; on the 3½ p.ct. maximum stock, at the rate of £3 10s. p.ct. per annum; and on the ordinary stock, at the rate of £5 12s. p.ct. per annum; carrying forward to the next account the sum of £145,290.

Dungannon Gas Company's Order Opposed.—The Dungannon Rural Council have decided to oppose the application of the Dungannon Gas Company for an order to supply the public and private lighting of Dungannon by electricity, and have requested Colonel Howard, J.P., and the clerk to attend the inquiry. The Clerk stated that the Council was opposed to the Gas Company having a monopoly. They had not made a move until Messrs. Graham Bros., Dromore, had applied for an order, and the Council had decided to support the latter.

Condition of Works at Congleton.—The condition of the Congleton Gas-Works buildings is engaging the attention of the Gas Committee, who have been informed that these were in a very dilapidated state. Mr. R. H. Lowe, who gave this information to the Committee, complained that, though the property was in need of repair, no attempt had been made to remedy it. The Gas Manager replied that he had deferred spending money on this work as there was a possibility of a portion of these buildings being taken down.

A New Works for Blackpool.—The Blackpool Gas Committee are calling a special meeting to consider the removal of Rigby Road Gas-Works to another site. The Manager estimates the extensions to existing works will cost £174,000, and that the erection of a new works on a fresh site would involve an expenditure of £390,000, made up of a new gasholder of 5 million c.ft., £60,000, trunk main to connect existing trunk mains, £40,000, and new works, complete to make 5 million c.ft. per day, including land, sidings, offices, &c., £290,000.

Imperative Renewals at Dundee.—The renewal of certain vertical retorts at the Dundee Corporation Gas-Works is imperative, according to Mr. J. Dickson, the Engineer. On being asked whether it was not possible to postpone the matter, Mr. Dickson said that if the scheme were postponed for a year they would not perhaps find it so easy to meet it. The present retorts had given 10 years' service, and that was a very long time for them to go. The only surplus plant they had now was horizontal retorts, which, built in 1903, gave very uneconomic gas production.

Gas Boilers at St. James's Palace.—Three of Wright's "Sunhot" gas boilers (Radiation Ltd.) have been installed in the refreshment departments and the hand-washing rooms at St. James's Palace for use during the Five-Power Naval Conference. The Office of Works was not permitted to undertake constructional alterations when making preparations at the Palace for the Conference, and extensive plumbing work was avoided by fitting these water storage heaters, which require no flues, use little gas, and yet maintain a constant supply of very hot water.

Big Extensions at Newcastle.—The Newcastle-upon-Tyne and Gateshead Gas Company have a big scheme in progress for extending and improving their works at Redheugh, Gateshead, and at Howdon-on-Tyne. At the Redheugh works a new carburetted water gas plant with a capacity of 2,500,000 c.ft. per day has been installed, the interesting features of which are automatic control, self-clinkering generator, waste-heat boilers, and a gravity coke conveyor. A new purifying plant to deal with 3 million c.ft. of coke oven gas per day is also being erected, and when completed it will be the largest cast-iron purifying plant in the north. Ultimately, the daily capacity of the plant will be increased to 5 million c.ft. At the Howdon works a new gasholder with a capacity of 3 million c.ft. is to be erected, the contracts for which will be placed shortly.

Commercial and Industrial.

Stock Market Report.

[For Stock and Share List, see later page.]

Gas Stocks and Shares received a fair measure of support last week, and prices continue steady. Gas Light £1 units and Imperial Continental ordinary stock recorded the lion's share of the business, and the values of both stocks increased in consequence.

The dividend announcements of the three Metropolitan Companies have now been made; and the following are the rates to be recommended for the past half-year:

—	December Half-Year. P.Ct.	Total for Year. P.Ct.	Previous Year. P.Ct.
	£ s. d.	£ s. d.	£ s. d.
Gas Light	2 16 0	5 12 0	5 11 0
South Metropolitan .	3 15 0	6 5 0	Same
Commercial . . .	3 10 0	6 0 0	,,

The accounts of the Aldershot Gas, Water, and District Lighting Company have been received, and show that the business of the Company has progressed satisfactorily. The Directors are recommending dividends for the past half-year at the full statutory rates—viz.:

—	December Half-Year. P.Ct.	Total for Year. P.Ct.	Previous Year. P.Ct.
	£ s. d.	£ s. d.	£ s. d.
"A" stock	3 2 0	6 1 9	5 14 3
"B" ,, ...	2 7 0	4 11 9	4 4 3
"C" ,, ...	2 10 0	5 0 0	5 0 0

The Company's "C" 5 p.ct. maximum stock now stands at 72½ (middle), but business was done last week at the top price of 75. Even at this figure the yield is £6 13s. 4d. p.ct.; and for such a high-class security, the price is extremely low.

Price changes last week were:

Rises: Gas Light ord., 3d. to 18s. 6d.-19s., 4 p.ct. pref., 1 to 70-79; Hastings and St. Leonards 3½ p.ct., 1 to 78-83; Imperial Continental, 10 to 360-380; Sheffield (at Sheffield) 4 p.ct. deb., 76-78; South Metropolitan ord., 1 to 100-102, 3 p.ct. deb., 1 to 54-57, 6½ p.ct. deb., 1 to 99-101. *Falls:* Colonial ord., 1s. to 20s. 6d.-22s. 6d.; Primitiva 4 p.ct. deb. (1911), 2 to 77-80 *ex* div.

Coal Markets.

The general trend of markets at the present time appears to be steady for prompt, but uncertain for forward. There is a general feeling that there is a good potential demand, especially from abroad, but it can be readily understood that buyers are inclined to hold off in the present uncertainty with regard to the future of the coal trade. As an example of the gradual recovery of export markets which was a feature of last year, an inquiry may be mentioned from Athens for good quality gas coal. This is an order which was lost for some time after the stoppage, but recently recovered, evidently with satisfaction to the buyers.

Coking coals have been something of a feature on the Newcastle market in the past week, which has given a certain stiffening to gas coal, though, for the time of year, this section is rather quiet. Quotations, however, are steady, at about 17s. 6d. f.o.b. for Wear specials, 16s. 9d. for best qualities, and 15s. 6d. to 15s. 9d. for others.

Yorkshire markets are quiet, on both home and export account, and no special features call for comment. Approximate official export prices, f.o.b. usual ports, are given as 18s. to 18s. 6d. for screened gas, 18s. washed trebles, 17s. 3d. to 17s. 9d. washed doubles, and 16s. to 16s. 6d. washed singles.

Contracts Open.

Coal.

The Malvern Urban District Council invite tenders for the supply of gas nuts. [See advert. on p. 270.]

General Stores, &c.

The Works and Ways Committee of the City of Nottingham invite tenders for the supply of stores and materials. [See advert. on p. 270.]

The Corporation of Ossett invite tenders for the supply of stores, workmen's tools, &c. [See advert. on p. 270.]

The Gas Department of the City of Stoke-on-Trent invite tenders for the supply of stores. [See advert. on p. 270.]

Mantles.

The City of Stoke-on-Trent invite tenders for the supply of gas mantles. [See advert. on p. 270.]

Tubes and Fittings.

The Gas Department of the City of Stoke-on-Trent invite tenders for the supply of wrought iron tubes and fittings. [See advert. on p. 270.]

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 27.

There are no changes to report in the prices of tar products.

Creosote for export is 6¼d.-6½d. per gallon f.o.b.

Pitch is 47s. 6d. per ton f.o.b.

Pure toluole is 2s. 5d. to 2s. 6d.; 95/160 solvent naphtha, about 1s. 5d.; pure benzole, about 1s. 11d.; and pyridine bases, about 3s. 9d., all per gallon.

Tar Products in the Provinces.

Jan. 27.

The average prices of gas-works products during the week were: Gas-works tar, 24s. to 29s. Pitch—East Coast, 46s. f.o.b. West Coast (f.a.s.) Manchester, 40s. 6d. to 41s.; Liverpool, 44s. to 45s.; Clyde, 44s. to 45s. Toluole, naked, North, 1s. 7¼d. to 1s. 8¼d. Coal-tar crude naphtha, in bulk, North, 9d. to 10d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 1s. to 1s. 0½d. Creosote, in bulk, North, liquid and salty, 3½d. to 3⅝d.; low gravity, 1½d. to 1⅝d.; Scotland, 3½d. to 3⅝d. Heavy oils, in bulk, North, 5½d. to 6d. Carbolic acid, 60's, 2s. 4d. to 2s. 6d. prompt. Naphthalene, £12 to £14. Salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

Tar Products in Scotland.

GLASGOW, *Jan.* 25.

Orders during the week have been more frequent. There is a fair market for cresylics at the lower prices now ruling, and motor benzole is in better demand.

Pitch continues scarce, and value is nominal at about 47s. 6d. to 50s. per ton f.a.s. Glasgow. The home trade price is 52s. 6d. to 55s. per ton *ex* works.

Tar is steady at 4d. to 4¼d. per gallon f.o.r. works, and some orders for large quantities are being placed at this level.

Creosote is not moving in any great quantity, but prices are mainly steady. B.E.S.A. specification is 3⅞d. to 4⅛d. per gallon; low gravity, 3d. to 3¼d. per gallon; neutral oil, 3d. to 3¼d. per gallon, all free on rails works.

Cresylic.—A fair volume of business is passing; but there is no change in prices, which are easy. Pale 97/99 p.ct. is 1s. 9½d. to 1s. 10½d. per gallon; dark 97/99 p.ct., 1s. 7⅝d. to 1s. 8⅝d. per gallon; pale 99/100 p.ct., 2s. 0½d. to 2s. 1½d. per gallon; high boiling, 1s. 10d. to 1s. 11d. per gallon all at works in buyers' packages.

Crude naphtha is quiet at about 5½d. to 6d. per gallon f.o.r. works.

Solvent naphtha is unaltered at 1s. 1d. to 1s. 2d. per gallon for 90/160 grade and 11½d. to 1s. per gallon for 90/190 grade.

Motor benzole is in better demand, and orders have been placed at 1s. 5½d. to 1s. 6d. per gallon filled into buyers' tanks at works.

Pyridine remains nominal at about 3s. 3d. to 3s. 6d. per gallon for 90/160 grade.

Benzole Prices.

The following are considered to be the market prices to-day:

	s. d.	s. d.	
Crude benzole . . .	0 10	to 0 11	per gallon at works
Motor ,, . . .	1 5	,, 1 6	,, ,, ,,
90 p.ct. ,, . . .	1 7	,, 1 8	,, ,, ,,
Pure ,, . . .	1 10	,, 1 11	,, ,, ,,

Trade Notes.

Spiral-Guided Holder for Bradford.

The Bradford Corporation Gas Committee have accepted the tender of Messrs. Robert Dempster & Sons, Ltd., of Elland, for the supply of a spiral-guided gasholder in "Armco" iron, for the Valley Road Works, and are applying to the Ministry of Health for sanction to a loan for this purpose. The decision includes the rescinding of a resolution of last February in regard to the installation of a waterless gasholder.

"Foochow" Anti-Corrosive Green Paint.

Messrs. Donald Macpherson & Co., Ltd., of Mitcham, have published a folder dealing with their permanent anti-corrosive green paint. These "Foochow" green paints—unlike Brunswick and other lead paints—are claimed to be completely stable against gas-works fumes and other deleterious gases of an acid nature. The paints are extensively employed by some of the largest and most up-to-date gas-works in the country, who welcome this opportunity of harmonizing their structures with the surrounding countryside.

Some United Steel Companies' Products.

Two folders recently received from the United Steel Companies, Ltd., of Sheffield, deal with drop stampings and quality steel products. The firm's range of drop stamps is capable of making stampings from a few ounces up to half a hundredweight or over, with a maximum length of 20 in. and a breadth or diameter of 12 in. Their quality steel, called "Tormol," is a modern alloy steel for highly stressed parts, very resistant to shock and fatigue, free from "temper brittleness," and well suited to the manufacture of large forgings.

(*For further "Trade Notes" see p.* 263.)

Bulk Gas Supply in Holland from the Pits to the Towns.

[COMMUNICATED.]

Arrangements are now in progress in Holland for following the example of Germany, and of France in a lesser degree, in the direction of the long-distance transmission of gas from the pit coke ovens to distant towns. The initiative in Holland has been taken by the managers of the State-owned mines in South Limburg, which are responsible for the production of most of the pit coal raised in Holland, and which turn out most of the coke, of which a quantity of 1,190,000 tons was exported in 1929, as against 620,000 tons in the previous year.

The total production of pit coal in Holland at both the State and the privately owned mines, which only amounted to 1,837,000 tons in 1913, has gradually risen without interruption to 11,612,000 tons in 1929, as compared with 10,920,000 tons in 1928. It is particularly from the coke ovens at the State mine Maurits, at Lutterade, that the transmission of gas is to take place, there having been erected there a large holder. From this place gas mains are being, or have been, laid in different directions right into Limburg and North Brabant, it being intended to despatch 25 million cub.m. of gas per annum.

The question has been under the consideration of the managers of the State collieries for some years past in connection with the developing production of coal and coke, but it was not found an easy matter to convince the local authorities, as has been shown by the protraction of the negotiations, of the advantage and economy of taking a bulk supply of gas instead of producing on their own account. However, the grant by the State mining managers of the individual demands made by certain authorities, especially in regard to the tariff of charges and the laying of the mains at the expense of the State, finally had the effect of inducing the Town Councils of Maastricht, Roermond, Venlo, and Eindhoven to enter into agreements to accept a bulk supply. It was provided that supply to Venlo and Eindhoven should begin on Jan. 1, 1931, while Roermond and Maastricht should receive gas in 1930. The minimum quantities fixed under the agreements are as follows: Venlo, 1·7 million cub.m. per annum; Roermond 1·35 millions; Maastricht, 3·5 millions; and Eindhoven, 9·5 millions—the gas being delivered at the local holders.

The laying of the gas mains, which have a length of 80 miles, has already been accomplished as far as Weert-Maarheeze, so that Eindhoven will be reached in the near future, while Venlo will be able to receive a supply this year. However, Eindhoven comes first into consideration owing to the greatly developing local industries and the fact that the gas-works there has become too small and consumers are awaiting the connection with the Lutterade Works of the Maurits mine. The main to Roermond was finished in the middle of January this year, while that to Maastricht has now been completed and the first supply of gas from South Limburg will begin next month. Roermond will follow in April, and Venlo at the end of this year. In the case of Eindhoven it is hoped to start the supply next August, and in all the four towns mentioned the local gas-works will be discontinued when the delivery from Lutterade has begun.

Though no unforeseen difficulties have been encountered in the laying of the mains, difficulties have been experienced in connection with rivers and canals which have had to be passed, while in the mining district of South Limburg itself obstacles were met with owing to the situation of the ground and the risk of subsidences, so that double mains often had to be laid. The mains used are those patented by the Escaut et Meuse Company, in which the seams are claimed not to be exposed to intense tensile or compressive stresses.

It is not intended by the managers of the State mines to restrict the supply of gas to the above-mentioned towns, as negotiations are being carried on with a number of other and smaller localities for securing a supply. For the most part these smaller places are said to have an electricity supply, and they are difficult to convince of the advantages of a gas supply from the State mines; while at the same time they shrink from the laying of a costly network of gas mains in their towns.

It is understood that negotiations are also now proceeding with a view to delivering gas for industrial purposes from Lutterade, and so far successful results are stated to have been obtained in regard to the ceramic industry in Maastricht.

Gas Cooking Meets Its Due Reward.

Lady Milne-Watson presents prizes to winners of a Greater London Cake Baking Competition organized by the London Gas Exhibit Committee at the Food and Cookery Exhibition, Olympia. The photo shows Lady Milne-Watson (on right) presenting 1st prize in the Fruit Cake Contest to Mrs. F. Stallon

The "Chelsea Three."

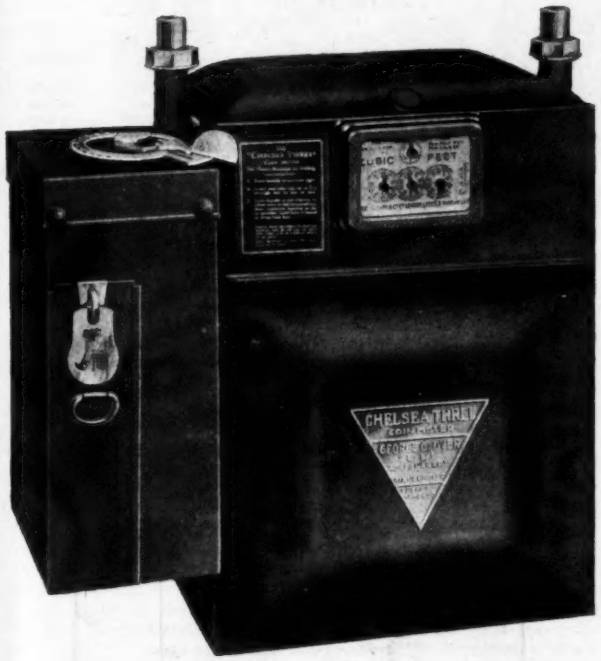
A Penny—Sixpence—Shilling Prepayment Meter Possessing Unique and Valuable Features.

The "Chelsea Three" is no ordinary prepayment meter, and it should prove a boon to gas undertakings and their consumers; the idea underlying this new departure is excellent, the ingenuity displayed in translating the idea into practice most intriguing, and the workmanship of the meter beyond criticism. This statement is a strong one, but we are convinced that it is more than justified.

No Pennies, No Gas.

Only the other day we read in a Scottish newspaper a letter calling attention to the inconvenience caused by lack of coppers for the prepayment meters. People are often handicapped during winter months, it was stated, by a dearth of copper change, and numerous householders, failing to get pennies, have often to resort to lamps and candles. The suggested solution of this difficulty was the emptying of meters more frequently. A more satisfactory solution, to our mind, from every point of view, would be the adoption of a flexible meter such as the "Chelsea Three."

We are, of course, aware that penny-shilling conversion meters have been in existence for some time, but the point is that the gas undertaking has to set the meter, and, once set, the meter—as far as the consumer is concerned—is a shilling meter or a penny meter. On the other hand, the "Chelsea Three" gives the consumer himself the marvellously convenient selection of 1s., 6d., or 1d.—whichever he finds most suitable at any particular moment. The makers of this meter—Messrs. George Glover & Co., Ltd., of Ranelagh Works, Chelsea—are deserving of unstinted praise for the manner in which they have simplified this complicated problem.



George Glover's New Patent "Chelsea Three" Coin Meter.

Besides the obvious advantage to the consumer, there is also to be borne in mind the fact that coppers are heavy and bulky coinage, the transport of which saddles the gas undertaking with much undesirable labour cost. In one concern in this country about 800 million pennies are collected every year from slot meters. The disposal of this immense quantity of copper requires a special organization, and presents in itself a problem never easy of solution.

How the Meter Works.

We do not intend to describe in any great detail how the "Chelsea Three" works, but we hope that the following notes will enable our readers to appreciate the ingenuity of the mechanism. The central idea is a tapered coin pocket into which the shilling, sixpence, or penny is dropped. The coin is arrested as it drops down the pocket, and engages between the teeth of a relevant toothed wheel mounted on a spindle. There are three wheels, geared, of course, in the ratio 12 : 6 : 1 for the shilling, sixpence, and penny respectively, and they are connected through suitable gearing to the value opening mechanism and counting train of the meter so as to allow a proportionate supply of gas to pass through the meter in accordance with the value of each coin inserted. Whatever denomination of coin is inserted, only the relevant wheel is brought into operation by rotation (by the consumer) of a finger-piece handle attached to the pinion spindle; the other two pinions "free-wheeling," as it were. At the end of its travel, the coin is released into the money box.

The quantity of gas to be delivered per penny is shown in cubic feet on the price-change wheel; and when this is set by the gas undertaking at the desired amount, the setting, of course, automatically determines the quantity delivered by the sixpence or the shilling. The setting is simply effected by a slotted locking screw of such design that, unless it is firmly screwed home, it prevents operation of the mechanism. When the price-changer has been set, the cover is replaced, and insertion of the cash box beneath automatically locks the cover in place, and a padlock on the cash-box makes a complete unit.

Other Safeguards for Supplier and Consumer.

When we inspected the "Chelsea Three" the other day, we were shown how a farthing would not function as a sixpence, nor a halfpenny as a shilling, in spite of the fact that there is such a minute difference in diameter between the silver and the copper coin of each pair; and the demonstration was convincing as well as interesting. Coins of smaller diameter than a sixpence are non-effective.

A further safeguard appealed to us immensely. Suppose the housewife inserted a coin in the meter, and, before she had time to turn the handle on the spindle, thus opening the gas valve, she was called away. It is quite possible for her to forget on returning that she had inserted a coin, and she might endeavour to insert another. Frugal housewives might not find themselves so forgetful; but, to realize the virtue of this safeguard, one has only to imagine the state of mind of a cook on her return to the meter after having previously inserted a coin and having been immediately called away to attend to the needs of a policeman! Whether housewife or cook, it will be impossible for her to insert another coin until the handle has been rotated and the coin already engaged in the appropriate wheel has performed its destined function and has been ejected into the cash-box. This is effected by a guard which, operated by the coin itself through the medium of a rocking lever with finger-like extensions, slides over the opening.

Aiding the Storekeeper.

We hope we have given our readers some general idea of the attractive features of the "Chelsea Three." Our story, however, would be incomplete if we failed to mention that Messrs. George Glover have incorporated in their new meter devices which, besides being helpful to consumer and supplier of gas, aid the storekeeper in the meter shops. In many districts there are different rates at which the prepayment meter is set. For example, some undertakings allow their consumers to hire apparatus, or hire-purchase appliances, and pay by their meter being set at a rate higher than that normally obtaining for prepayment supply. To facilitate work and obviate error, the "Chelsea Three" is fitted with an indicating dial on the handle, and a pointer on the side of the meter enables the storesman to see at a glance at what rates the meter is set.

We understand that the colour of the "Chelsea Three" will be green, and we think we are right in suggesting that its sales will be evergreen.

A Glimpse into the Past.

[From the "JOURNAL" Eighty Years Ago.]

There are now at work at the South Metropolitan Gas-Works, Old Kent Road, two benches with five clay retorts in each, which have been uninterruptedly in action for upwards of seventeen months. They are Ω-shaped, 20 in. wide by 12½ in. high and 7 ft. 6 in. long, and are calculated to have produced, up to the present time, at least 1,800,000 c.ft. of gas per retort, with an expenditure of fuel not exceeding that of the iron retorts used on the same station; and there is every prospect of each retort making upwards of 2 million c.ft. of gas before it is worn out. These excellent specimens of clay retorts are made in one piece.

A Nomogram for Reduction of Gas Volumes to N.T.P.

By GUY BARR, D.Sc., of the National Physical Laboratory.

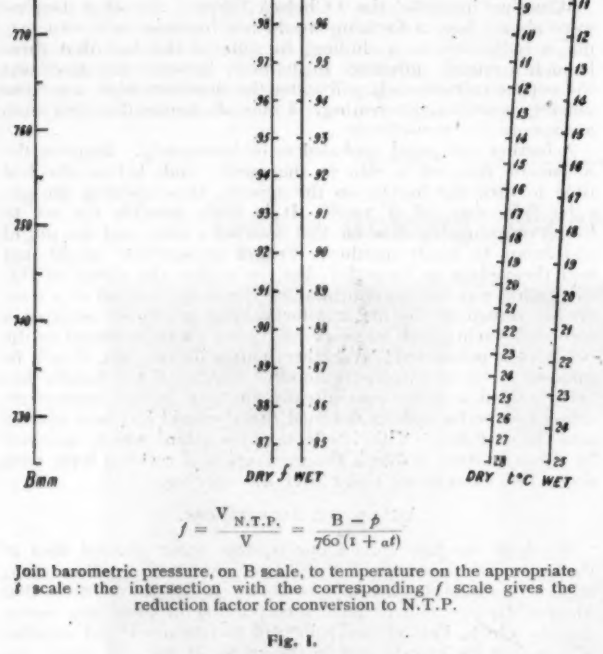
[Paper before the Chemical Engineering Group of the Society of Chemical Industry, Jan. 10.]

The recent description by Coste ("The Analyst," 1929, p. 656) of a nomogram for the approximate reduction of gases to standard conditions suggests that a more pretentious diagram, which was constructed by the author several years ago, may be of use to others in saving reference to tables and calculation.

Ostwald (Z. f. angew. Chem., 1919, **32**, 359) cited some earlier attempts and described a chart containing two parallel logarithmic scales for barometric pressure and reduction factor; the position and graduation of the temperature scale were determined graphically on the assumption that the gas was saturated. It will be realized that the temperature scale is a straight line, divided proportionately to log. $(1 + \alpha t)$, when the gas is dry; when the gas is wet, logarithmically divided scales cannot afford an exact solution owing to the impossibility of separating the variables B and p in the equation

$$f = \frac{V_0}{V} = \frac{B - p}{760\,(1 + \alpha t)}$$

Coste avoids the difficulty by attaching to the chart a vapour-pressure curve, so that p may be subtracted from B before performing the alignment.



$$f = \frac{V_{N.T.P.}}{V} = \frac{B - p}{760\,(1 + \alpha t)}$$

Join barometric pressure, on B scale, to temperature on the appropriate t scale: the intersection with the corresponding f scale gives the reduction factor for conversion to N.T.P.

Fig. 1.

The equation for dry gases may also be solved by the use of a Z-chart, containing two parallel scales for pressure and temperature divided linearly, the diagonal being graduated to give the reduction factor.[1] The adoption of linear scales facilitates the construction and increases the accuracy of interpolation. Such a chart has been described by Liesche (Chem. Fabrik, 1928, **1**, 621), embracing the range 5°-25° C. and 700-800 mm. pressure. A nomogram of this type cannot, however, be adapted to deal with moist gases owing to the form of the equation, which requires that the temperature scale be non-uniform and curved.

The nomogram illustrated in fig. 1 has parallel linear scales for barometric pressure and for conversion factor. When used for dry gases it differs from Liesche's only in the position and type of graduation of the temperature and factor scales. It possesses the important advantage, however, that the t scale may alternatively be so graduated as to refer to moist gases.

[1] For a particularly clear exposition of a simple method for finding the position and graduation of nomogram scales, see Chapter VIII. of Peddle's "The Construction of Graphical Charts" (McGraw Hill Book Co., Inc., New York, 1919).

The scales used in the range selected are:

For dry gases:

$$x = 0 \quad y = 0{\cdot}5\,(B - 725)$$
$$x = 1 \quad y = 200\,(f - 0{\cdot}865)$$
$$x = 1 + \frac{0{\cdot}52631}{0{\cdot}47368 + \alpha t} \qquad y = \frac{17{\cdot}789 - 173\alpha t}{0{\cdot}47368 + \alpha t}$$

For wet gases:

$$x = 0 \quad y = 5\,(B - 725)$$
$$x = 1 \quad y = 200\,(f - 0{\cdot}845)$$
$$x = 1 + \frac{0{\cdot}52631}{0{\cdot}47368 + \alpha t}$$
$$y = \frac{21{\cdot}789 - 169\alpha t - 0{\cdot}26316\,p}{0{\cdot}47368 + \alpha t}$$

The scale unit for x is independent of that for y; in the figure it has been taken as 12·5 and 14 times the y unit for the dry and wet scales respectively, the difference giving a reasonable separation of the axes. If a common factor scale is used for both conditions, the temperature scales are too close for convenience.

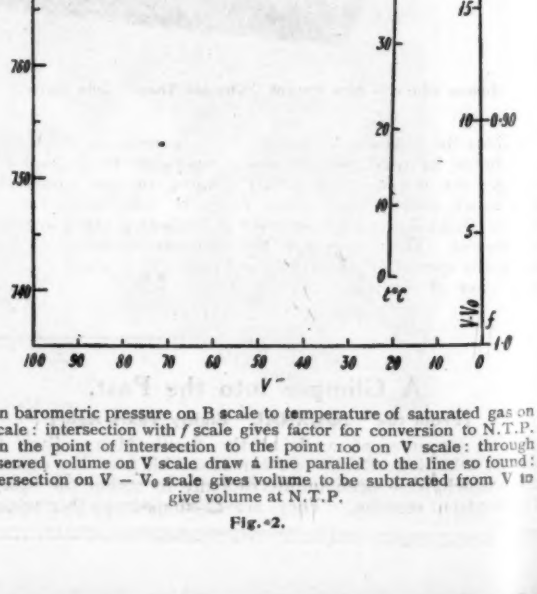
If the diagram is carefully drawn, the factor may be read to ± 0·0001 even when reduced to an over-all size of 13 cm. square; this precision will suffice for all ordinary calculations, and is in fact greater than that with which the gas laws themselves hold except for the most "permanent" gases. Using the average value 0·003669 for α, the following values of the co-ordinates for the temperature scales have been calculated.

t° C.	y		t° C.	y	
	Dry.	Saturated.		Dry.	Saturated.
8	25·270	..	19	10·544	10·436
9	23·834	..	20	9·313	8·724
10	22·419	..	21	8·098	7·007
11	21·024	24·080	22	6·900	5·283
12	19·649	22·369	23	5·717	3·552
13	18·294	20·662	24	4·550	1·812
14	16·957	18·957	25	3·398	0·061
15	15·639	17·254	26	2·260	..
16	14·339	15·552	27	1·137	..
17	13·056	13·849	28	0·029	..
18	11·791	12·144	—	..	..

The values of x for either scale are given by:

t° C. =	8	11	15	19	
$x - 1$ =	1·04627	1·02388	0·99545	0·96856	
			23	25	28
			0·94310	0·93086	0·91308

The temperature scale for dry gases is a straight line, but that for wet gases is curved. The curvature is, however, very slight, and the five points indicated are ample to fix the posi-



Join barometric pressure on B scale to temperature of saturated gas on t scale: intersection with f scale gives factor for conversion to N.T.P. Join the point of intersection to the point 100 on V scale: through observed volume on V scale draw a line parallel to the line so found: intersection on $V - V_0$ scale gives volume to be subtracted from V to give volume at N.T.P.

Fig. 2.

tion and shape of the curve. The sub-division of the t scale into 1/5° C. is most readily performed by projection.

Fig. 1 is, in reality, two nomograms, of which one scale (B) has been made identical. If the application of the diagram is to be confined to dry or to wet gases only, it may be convenient to add a uniformly divided horizontal scale, as indicated in fig. 2, by means of which the necessary multiplication of the factor by the observed volume may be effected. The use of this scale (see Legend) depends on the relation

$$\frac{V - V_0}{V} = \frac{(1 - f)\,100}{100}$$

and the production of similar triangles, the sides of which are proportional to the members of this equation. In view of the lower precision obtainable by means of a proportional chart, the t scale has here been placed between the B and f axes, with some sacrifice in the accuracy of determination of f, so as to increase the length of the V scale. Even so, on a diagram about 13 cm. square, on which the $V-V_0$ scale may be divided into 0·2 c.c. intervals, the volume correction will not normally be accurate to better than ± 0·1 c.c. The equations for the upright scales are

$$x = 0 \quad y = 0{\cdot}5\,(B - 735)$$
$$x = 20 \quad y = 100\,(1 - f) \text{ and } y = V - V_0$$
$$x = \frac{20\,(1 + at)}{1{\cdot}2632 + at} \qquad y = \frac{0{\cdot}0329 + at + 0{\cdot}001316b}{0{\cdot}01\,(1{\cdot}2632 + at)}$$

The horizontal scale for V is given by:

$$x = 0{\cdot}2\,(100 - V) \qquad = 0$$

Mobile Air Compressor Equipment for Gas Undertakings.

MOBILE COMPRESSOR OUTFIT IN OPERATION AT BRADFORD.

Our attention has been directed to an ingenious application of compressed air for the instant service of gas, water, and electricity undertakings. It has been made available by the Scholey Construction Company, of 137, Victoria Street, Westminster, S.W. 1. Already it has been adopted by the Bradford Corporation's Gas Department. A photograph of the vehicle supplied to the order of Bradford is given here.

Immediately a call is made at headquarters for the use of the vehicle, it can be taken out at once, run to the scene of action at a speed of 30 miles an hour, and in 30 seconds the engine can be uncoupled from the rear wheels, coupled to the air compressor, and be furnishing compressed air to the tools for excavating the road where a gas leak may have occurred.

While a construction job might need a three or four hammer compressor, the emergency or special job can be executed well with a smaller and less expensive machine. Speed in emergency work is essential. Men and tools must be rushed to the spot immediately; and this cannot be done with the ordinary type of compressor. A compressor for emergency work must travel under its own power; it must also be economical; and its first cost must be reasonable. While providing mobility and lightness, it must be sufficiently robust to withstand the strain set up by power hammers, and the usual compressor work. The design and workmanship must be such that repairs and maintenance charges are at a minimum even when operating in the rough conditions associated with gas explosions, main fractures, &c.

While the most obvious use of the machine is for road breaking and for trenching, it is also handy for repair work. The workmen are conveyed in the front part of the vehicle, the compressor and tools in the rear.

The apparatus can be used for spraying paint for lamp standards or gasholders, and for operating lathes and tools in the workshops.

The vehicle is provided with an auxiliary radiator and fan for use when the chassis is at rest on the job. The air receiver is of the riveted type, with manhole, pressure gauge, safety valve, and drain cock. An outlet air cock is furnished, fixed in a suitable position, to take the requisite hose for connecting to the excavating tools.

The compressor is driven through a special shaft running in roller bearings by means of clutch gears arranged to be driven from the flywheel. Means are provided for throwing this gearing in and out, as required, from the driver's seat; the change-over being rapidly effected. The driving mechanism of the chassis is not interfered with in any way; and as it is of standard type, it is inexpensive. The car will negotiate any hill which is within the capacity of the average commercial motor.

Report on Fires in Steamship Bunkers and Cargo Coal.

In 1925, the question of the spontaneous combustion of coal on board ship was brought to the notice of the Department, and it was arranged that an investigation should be carried out into the causes of such fires.

With this object a circular was prepared, submitted to the Marine Department of the Board of Trade, and issued by them to their principal officers and surveyors, arranging for a report on all fires to be forwarded as early as possible for the information of the Director of Fuel Research, and detailing the information that should, if possible, be furnished. At the same time, shipowners were asked, through the Chamber of Shipping and the Liverpool Steamship Owners' Association, to instruct their masters to notify the Board's surveyors of any case of spontaneous combustion of coal.

This report (Department of Scientific and Industrial Research, Fuel Research Special Report No. 5; obtainable at 2s. net from Adastral House, Kingsway, W.C. 2) deals with the results of the investigation, and the conclusions reached. The first portion of the report contains a brief account of the causes of spontaneous combustion of coal, and the conditions under which self-heating is liable to take place, together with references to the literature on the subject, and the results of previous inquiries. The second portion deals with the results of the present investigation, and analyzes the data obtained during three years, dealing with 336 fires which occurred on 272 ships, together with suggestions as to the precautions desirable to prevent fires.

Recovery of Ammonia in Gas Manufacture.

Indirect, Semi-Direct, and Direct Processes.

By A. PARKER, D.Sc.

Reply to the Discussion of the Second Report of the Ammonia Sub-Committee of the Institution of Gas Engineers, presented at the Meeting of the Institution on Nov. 14, 1929.

The object of the paper under discussion was to ascertain whether the cost of recovery of the ammonia obtained during the manufacture of gas for town supply might be reduced by the adoption of the so-called semi-direct or the direct process in place of the indirect process generally employed in the gas industry. The relative merits of the three methods of ammonia recovery is a subject on which many coal carbonization technicians hold decided and different opinions, and it was anticipated that a lively discussion of this section of the Second Report of the Ammonia Sub-Committee would have ensued. Time did not permit, however, of more than a brief introduction of the paper on the three methods of ammonia recovery at the meeting in November last; but contributions in writing were invited, and it is proposed to provide an opportunity for further discussion of the paper at the meeting of the Institution to be held at Leeds in June.

The reply to the discussion has been held over to allow ample time for written contributions to be received. Mr. L. H. Sensicle, who spoke at the meeting on Nov. 14, strongly favoured the direct process, and in a written contribution published in the "GAS JOURNAL" for Dec. 18, 1929, Dr. G. E. Foxwell recommended the semi-direct process.

MR. SENSICLE'S CRITICISM.

Mr. Sensicle expressed the opinion that the report overemphasized the power costs of removing heavy tar and handling the hot gas in the direct method of recovery. In the report it was concluded that the total quantity of power required in the direct system for the tar extractors and exhauster operating on hot crude gas would be between three and four times the power required for the exhauster dealing with cooled gas in the indirect system; and an example of the effect of the additional power on the cost of the direct process was given on the assumptions that the ratio of the power requirements for the two processes is 3·5 and that the cost of power is 0·5d. per B.H.P.-hour. Assuming that coal containing 3 per cent. of adhering moisture and yielding 6 per cent. of water by destructive distillation—*i.e.*, yielding 9 per cent. of water on carbonization—were carbonized, Mr. Sensicle has calculated that the power for driving the exhauster operating on the gas and water vapour at 80° C. in the direct process would be only 1·6 times that required by the exhauster handling the cooled gas at 60° Fahr. with indirect recovery. This factor of 1·6, however, does not allow for the additional pressure, about 10 in. water gauge, necessary to force the gas through the saturator in the direct process. Assuming that the saturator caused an increase of pressure from 20 to 30 in. water gauge, the factor of 1·6 should be increased to 2·4. Further, a total quantity of moisture equal to 9 per cent. of the weight of coal carbonized would be less than the average quantity in the gas industry, for many of the coals employed contain more than 3 per cent. of adhering moisture, and the gas from steamed vertical retorts (which carbonize about one-half of the coal employed in the gas industry) carries forward appreciable quantities of undecomposed steam.

The power to drive the centrifugal tar extractors, not including the power consumed in supplying liquor to these extractors, in direct recovery installations is usually about one-half that required by the exhauster operating on the hot gas. It is clear, therefore, that the factor of 3·5 used in my paper to represent the power to drive the exhauster and tar extractors in the direct recovery system relative to the power to operate the exhauster dealing with cooled gas in the indirect system is by no means an exaggeration.

Mr. Sensicle suggested that the basic figures in the example given in the report to illustrate the quantities of power required by the exhauster and tar extractors in the direct recovery system and by the exhauster in the usual indirect system are wrong. The assumptions were made in the example in the report that an engine of 10 B.H.P. would be required in the indirect system for 60,000 c.ft. of gas per hour, and 35 B.H.P. with direct recovery. Mr. Sensicle endeavoured to substantiate his suggestion by another example in which 216 B.H.P. is used to deal with 1,200,000 c.ft. of gas per hour with indirect recovery. This is equivalent to $\frac{60}{1200} \times 216$ B.H.P. for 60,000 c.ft. of gas per hour—*i.e.*, 10·8 B.H.P., which is very close to the figure of 10 B.H.P. used in the example in the report, and thus confirms the assumptions made. It is difficult, therefore, to understand the reasons which led Mr. Sensicle to suggest that the basic figures assumed in deducing power costs as given in the report of the Ammonia Sub-Committee are not correct.

The cost of power was taken as 0·5d. per B.H.P.-hour as an example and as representing a reasonable figure for a gas-works of average size and operating under average conditions. It is appreciated that the cost of power varies considerably at different works, but the necessary adjustments in this respect can readily be made for each individual case. The lower cost of 0·3d. per B.H.P.-hour assumed by Mr. Sensicle may be correct for an efficient works producing 1,200,000 c.ft. of gas per hour, as in the example given by him; but an installation of this size, and consequently carbonizing about 100 tons of coal per hour, is considerably larger than the average gas-works.

Mr. Sensicle objects to my statement that it is not possible to predict with any certainty whether the capital and maintenance costs of the direct process would be greater or less than those of the indirect process. He states that it is only necessary to apply to contractors specializing in both forms of recovery plant to discover that the capital cost of the complete plant for direct recovery is considerably less than the cost of equal capacity, indirect recovery plant, and the maintenance costs are definitely lower. In this connection Mr. Sensicle very kindly provided me with estimates of capital cost in his possession, and my statement was written after full consideration of these estimates. I am not aware of any plant constructors with any appreciable experience of installing both direct and indirect ammonia recovery systems to meet the requirements of the gas industry in this country.

It must be emphasized that the paper deals with the gas industry and not the coking industry, and there are important differences in the two industries.

The uncertainty in estimating relative capital costs might be illustrated by pointing out that purifiers of greater capacity would be required with the direct than with the indirect process. There is insufficient experience of the direct process in the gas industry, however, to enable this additional cost to be estimated with any accuracy. After careful consideration of all factors, it was assumed in the report that the total capital and maintenance costs would not be widely different with the two systems installed to meet the conditions of the gas industry.

Mr. Sensicle has concluded that the statement in the report that a saturator of usual design in direct recovery cannot be operated successfully with large fluctuations in the rates of gas production is a concession to the early failures in the gas industry with a process purporting to be a direct process, but in reality less than one-quarter direct. It is not easy to understand how Mr. Sensicle arrived at this conclusion, which is certainly not correct. Presumably the term "less than one-quarter direct" refers to processes in which the cooled gas is passed through washers containing a solution of sulphuric acid in place of scrubbers supplied with water. These processes have never been considered or described by me as direct. The true direct process based on the principles applied in the coking industry was tried some years ago at a gas-works in this country. The process failed owing to certain technical difficulties, but it is only fair to state these could no doubt be avoided in new installations. Mention was also made in the report of a type of saturator with certain pipes specially designed by Mr. Sensicle in 1928 for the purpose of dealing with large fluctuations in the rates of gas production. It would appear, therefore, that Mr. Sensicle himself considered that saturators of usual design are not satisfactory for dealing with large fluctuations in the quantities of gas made.

REPLY TO DR. FOXWELL.

Dr. Foxwell clearly appreciates the important point, in considering the application of the three methods of ammonia recovery in the gas industry, that gas-works differ considerably in size, and that processes which may be suitable for large installations may not prove satisfactory in small works. Comparison of Dr. Foxwell's contribution with the report shows that on many points which he has raised we are practically in agreement, but his figures for the probable comparative costs of the indirect and semi-direct processes applied in the gas industry would seem to be based on a misinterpretation of the data given in the paper by Mr. Hollings and Dr. Pexton (First Report of the Ammonia Sub-Committee) and in my paper.

The direct or the semi-direct process would be an integral part of the installation manufacturing gas for public supply,

and with the exception of a small quantity of crude concentrated fixed ammonia liquor from the direct process, there would be no liquor which could be transported to another works for the manufacture of sulphate or other product. A true comparison of these two processes with indirect ammonia recovery can only be made, therefore, on the assumptions (1) that the ammonia liquor from the indirect process is converted into sulphate on the gas-works at which the liquor is produced, and (2) that in each case the effluent liquors can readily be disposed of. There are no charges for the transport of liquor to another works to be taken into account, therefore, in estimates of comparative costs of ammonia recovery by the three processes.

In my paper, the quantity of steam required in the manufacture of sulphate from ammonia liquor by the usual indirect process was taken as one-third of the weight of liquor distilled, to cover the requirements of the distillation, production of milk of lime, and the operation of pumps. The item of £3 2s. 4d. for the transport and pumping of 2800 gallons of 10 oz. liquor at 22s. 3d.* per 1000 gallons should therefore be deducted from Dr. Foxwell's estimate of the cost of manufacture of one ton of sulphate of ammonia by the indirect process, relative to the cost by the semi-direct process. When this deduction is made, Dr. Foxwell's figures confirm the statement made in one of the conclusions in the report, that there does not appear to be any decided financial advantage in either process (direct or semi-direct) over the indirect process. This statement of comparative costs was made in the report on the assumption that in the indirect process every effort is made to obtain the crude liquor as concentrated as possible, to ensure the minimum cost of distillation for the production of sulphate.

The manufacture of sulphate of ammonia, however, by any one of the three processes is intimately connected with the problem of disposal of effluent liquors. Attention is therefore directed to the suggestion at the end of my paper, that the possibilities of replacing the indirect process in the gas industry might be again considered when the investigations of the Liquor Effluents Research Committee of the Institution of Gas Engineers have proceeded further.

* This figure was taken by Dr. Foxwell from the paper by Mr. Hollings and Dr. Pexton. Their paper dealt with the economies to be obtained in the indirect process by the partial or complete elimination of water used in the extraction of ammonia so as to obtain a liquor as concentrated as possible. The figure was used to illustrate the savings in cost of transport in an example in which the liquor had to be conveyed from the gas-works to a sulphate works.

The Koppers "C. A. S." Process.

By Dr. HEINRICH KOPPERS.

Reply to Dr. E. W. Smith's Criticisms in the "JOURNAL" for Dec. 18, 1929.

The article by Dr. Smith which appeared in a recent issue of the "GAS JOURNAL" (Vol. 188, p. 767), entitled "A Review of the Koppers 'C. A. S.' Process as applied to British Conditions," contains certain criticisms upon this process, which are based upon an incomplete knowledge of the practical details thereof. This is probably due to the brief nature of the communication which was submitted to the Institution of Gas Engineer at the request of a member of the Ammonia Committee ("JOURNAL," Dec. 4, 1929, p. 643). The communication, which was hurriedly completed for the express purpose of giving a brief survey of the new process to the Institution of Gas Engineers, was not intended to describe fully the "C. A. S." process. It was also not considered advisable to publish all the details of the system.

Nevertheless, in order that a false impression should not be created, it is considered desirable to reply to certain of Dr. Smith's criticisms.

The Koppers "C. A. S." process is only partly based upon the use of known single chemical reactions, and the system as a whole is based upon a new foundation, as the former Feld process has not proved a success. It may, therefore, be claimed that the "C. A. S." process is in principle new.

(1) Dr. Smith assumes that the removal of sulphuretted hydrogen is performed by an alkaline suspension of iron hydroxide; from this he arrives at the conclusion that a complete removal of the sulphuretted hydrogen is impossible, because, with the well-known wet gas purification process using iron hydroxide, it is necessary to employ oxide purifiers for the removal of the last traces of H_2S. A complete removal of H_2S is, in fact, obtained by the Koppers "C. A. S." process, because the gas is washed not only with a suspension of iron hydroxide, but also with other iron compounds. The guarantees mentioned in the communication referred to, that the gas will be free from H_2S as shown by the lead acetate paper test over a period of 60 seconds, is the test which corresponds to the German specification for purity. The guarantee, however, can readily be extended to embrace the British test of 180 seconds, as results from practical large-scale operation of the plant have shown that there is no discoloration of the lead acetate paper when the test is extended over a period of 5 to 10 minutes.

(2) The economic conditions in England, according to Dr. Smith, render the oxide purification of gas more economical than processes which combine ammonia recovery with purification from sulphur and treatment of the cyanogen compounds as embodied in the "C. A. S." process. Is it not more reasonable to suppose that the indirect way of using sulphuric acid which, moreover, is made in outside works, is less economical than the direct recovery of the ammonia contained in the gas in the form of ammonium sulphate derived directly from the H_2S, the more as the cyanogen compounds present in the gases are, at the same time, converted into ammonium sulphate? The particular advantage of the "C. A. S." process lies especially in the fact that works using this system are rendered independent of the market for spent oxide, for sulphuric acid, and for fresh oxide for purification purposes.

(3) Dr. Smith has, furthermore, expressed the opinion that the increase in the yield of ammonia due to the transformation of cyanogen into ammonia is more than neutralized by losses due to the use of concentrated ammonia liquor. The production of ammonia liquor necessarily results from the cooling of the gas for the separation of tar. The ammonia liquor so produced is added to the washing liquid in the "C. A. S." process, not to remove H_2S from the gas directly, but to use it in combination with the H_2S contained in the gas. This is done by a reaction with iron thionate (contained in the washing liquid), whereby it is transformed into a non-volatile combination, and ammonium thiosulphate and iron sulphate are produced. The reaction is so operated that the percentage of ammonia in the washing liquid never reaches any considerable concentration, so that losses of ammonia are thereby avoided, as any small traces of ammonia leaving the scrubbing plant are removed by washing in a final scrubber with a freshly regenerated thionate solution having an acid reaction. This method of operation is similar to the method adopted in the well-known semi-direct process in which also ammonia is added to the gas before the saturator, in order to combine it therein with the sulphuric acid.

The increase in ammonia yield claimed by reason of the recovery of cyanogen and its conversion into ammonia has actually been obtained in practical operation—an advantage which must not be overlooked.

(4) It is felt that Dr. Smith lays too much stress upon the necessity for skilled supervision of the operation of a "C. A. S." plant. He has probably been led to this view by the apparent number and intricacy of the reactions which take place in the "C. A. S." apparatus. In practical operation, we find that the "C. A. S." plant requires scarcely any additional chemical control or personnel beyond that of the ordinary recovery plant used in the gas and coking industries.

In the foregoing we have only dealt briefly with the points raised by Dr. Smith. It can, however, be said that the practical operation of a large-scale "C. A. S." plant up to the present time has entirely fulfilled expectations, and we shall not fail on a later occasion to report in greater detail the development of the Koppers "C. A. S." process.

Gas-Works Closes Down.—It is reported that, owing to depression in trade and loss of consumers, the gas-works at Beaufort, in the Ebbw Vale, has been forced to close down. There were some five hundred gas consumers in the district, and appeals by the local Council to extend the period of notice given by the Gas Company met with a refusal. The most recent figures available in connection with the Company show that the make was 6 million c.ft. per annum, and the price charged 7s. 6d. per 1000 c.ft. Until the Council can make arrangements for the installation of electricity, Beaufort residents must resort to the old-time methods of illumination by candles and lamps.

Present Requirements of Coke Ovens.*

By L. H. SENSICLE, B.Sc., F.I.C.

The widespread and largely continued delay in the modernization of bye-product coking plant in this country since the war has at least had one advantage; it has afforded full scope for us to watch the trend of development in other countries, and to ascertain after sufficiently long periods of operation what developments have contributed most to the economic and technical development of the industry. It is undoubtedly a fact that countries such as Germany have been in a favoured position owing to the apparent readiness with which capital was forthcoming to modernize their coking industry after the war, and that the resulting cheapening of their export coke has depressed prices here and multiplied our difficulties. The rise in value of small coal consequent on pulverized fuel applications, and the general uneconomic production resulting from the obsolescence of most of the plant in this country have intensified the interest taken by coke oven managers in the possible reconstruction of their plant.

In the long run the delay may prove to have been not without advantage since a widespread programme of re-organization would now place us ahead of the Continental producers who reconstructed their plant at great expense a few years ago. An extensive re-organization and reconstruction of coking plant occurred in Germany in connection with the great Ruhr gas grid scheme, the full results of which are not so far apparent. Such an incentive has not yet arisen in this country, though the possibilities of similar projects are being thoroughly explored by a representative committee. Neglecting such eventualities as the above, the potentialities of modern plant hinge to some extent upon the ownership. There are four types of owner, (1) iron and steel manufacturers, (2) colliery companies, (3) large chemical industries and large gas concerns, (4) independent coke manufacturers.

Modern opinion would probably be that for class (1) the coking plant should be situated near the blast furnaces and steelworks where the surplus gas can be used for soaking pits, open hearth furnaces, &c., and the coke can be conveyed readily to the blast furnaces. Colliery owners would be best served by ovens situated centrally among a group of collieries supplying coking coal. The disposition of ovens for class (3) is obviously at the usual manufacturing site, while class (4) will choose a site near large towns where domestic coke markets are in existence or surplus gas can be taken by the statutory distributors; or a site near shipping staiths will be chosen so as to facilitate export of coke. Combinations of possibilities are readily conceivable in special circumstances, and the question of cheap transport of coal to the ovens obviously needs consideration. The economics of coke oven gas utilization in industry are intimately connected with the above question.

THE COMPOUND INSTALLATION.

In view of the overlapping of potentialities at a given coking installation, it is now considered essential to instal ovens of the compound type—*i.e.*, those which can be heated by coke oven gas or low-grade gases such as producer or blast furnace gas at will. Such alternatives are obviously desirable at steel works, and at those plants supplying gas to towns, while it is not unlikely that large gas companies owning coke ovens will employ the compound oven principle to counter fluctuating demand for gas by using producer or oven gas as desired for heating the ovens. Another essential requirement is an oven of high capacity which will ensure that labour and overhead costs per unit of coal carbonized are low. High capacity is secured by constructing the ovens of adequate height and length. Width is controlled, however, by other considerations, such as type of coal to be carbonized, kind of coke to be made, and speed of carbonization required, these three factors being inter-related in various ways and of a character necessitating very careful study. The maximum length allowable is controlled by the length of ram arm feasible from an engineering point of view, and it would appear that the limit in this direction is being approached with ovens much over 40 ft. long.

ESSENTIALS IN COKING PRACTICE.

Great essentials in modern coking practice are ease of manipulation and low labour requirements. As regards labour saving, such accessories as self-sealing doors and mechanically operated door lifters are almost universal on the Continent and are common to the Collin oven. The heating system, while intricate from a draughtsman's point of view, is a really remarkably simple to control. There are four gas tuyeres in each wall, two on each side of the battery and terminating in the middle of the wall. They are horizontal and perfectly straight and accessible from the ends. Each combustion flue is accessible from inspection holes at the top of the oven, while the ports communicating between each combustion flue and its adjacent vertical ducts are visible from inspection holes on either side of the battery. Labour requirements are reduced to the minimum by the previously mentioned mechanical devices, while coke quenching is done by either of two methods involving no hand quenching. One of these is the modern standard coke car, water tower, tower bench, and belt conveyor, and need not be described. The other method is the Collin dry cooling method whereby the heat of the coke is conserved and used for steam raising. Such a process is an obvious further step towards the ideal of maximum heat conservation in industrial processes, and it would seem inevitable that dry cooling methods will become standard practice in the coking industry.

The system of steam generation from the sensible heat of the coke yields from 900 to 1000 lbs. of steam per ton of coke. The magnitude of this amount will be seen when it is said that the heat conserved by this steam is nearly half the amount used to heat the battery of ovens. It is, further, of interest to consider a battery of Collin ovens fitted with dry quenching plant and to estimate the power equivalent of the steam raised by the quenching plant. Assume a battery with 100 tons of coal per day throughput.

Coke made per day	70o tons (say)
Steam raised by Collin dry quenching plant at 950 lb./ton coke	665,000 lbs. per day 27,700 lbs. per hour

It will be noted that the hot gases pass first through steam superheaters, and thus we have superheated steam available. Assuming a condensing turbine is used, the consumption of steam per KW.-HR. should be about 12 lbs. Therefore:

Power generated per hour is 2300 KW.-HR.

Thus, if all the steam from the coke cooling plant were used for power generation there would be enough power for the needs of the whole bye-product coking installation—*i.e.*, 2300 KW. continuously generated.

Regarding the Collin oven, it is necessary to know in what degree it satisfies the modern requirement of heating economy. It is important that the consumption of gas for heating the ovens shall be as low as possible in order that the maximum amount of surplus gas may be available. It has been found on Collin installations in Germany that the heat consumption per lb. of coal carbonized is as low as 700 B.Th.U.—a figure which is in the lowest scale of modern figures. The figure, of course, varies according to the moisture content of the coal charged, and also to some extent according to the water of decomposition yielded from the coal on carbonization; but it is largely determined by the shape, size, and design of the oven and regenerators. The recent tendency towards high-capacity ovens has naturally tended to reduce the heat consumption figures obtainable since the outer surface area exposed in a battery has thus been reduced in relation to the amount of coal carbonized. The speed of carbonization has also been effective by causing a reduction in the time during which heat is being radiated and conducted away during carbonization of the charge. The high efficiency of the Collin oven is undoubtedly largely due to high transmission of heat from the combustion spaces to the charge promoted by the continuous heating of all parts of the wall, and by the efficient extraction of sensible heat from the spent gases by the regenerators before passage to the stack.

LIMIT OF ECONOMY NOT YET REACHED.

It would appear that the limit of economy has not yet been reached in oven heating, and it is feasible that there will be reductions effected in the heat lost by radiation and convection from the battery by the more widespread use of insulating material in doors and along the top of the battery. Incidentally, it should be said that the dry quenching system is really a method of effecting an enormous reduction in the heat consumption. This is so because much of the heat supplied to an oven is used to heat the charge from cold to its final temperature. The calculation would be as follows:

Steam from Collin coke cooler—	
Per ton of coke	950 lbs.
Per ton of coal carbonized	665 lbs.
Representing heat saved per ton coal	665,000 B.Th.U.
Per lb. coal	300 B.Th.U.

Thus, if the over-all heat consumption was 700 B.Th.U. per lb. of coal carbonized, it is justifiable to deduct the 300 B.Th.U. recovered at the coke cooling section, leaving 400 B.Th.U. as the net heat consumption per lb. of coal at the battery. This 400 is made up by radiation, &c., losses previously mentioned, together with the latent heat and sensible heat of gases and vapours passing up the ascension pipe. It may be added that even the latter source of heat is now being partially

* From a paper read before the Coke Oven Managers' Association (Northern Section), Dec. 19, 1929.

utilized in the Barrett system of installing tar stills on the oven tops and using the heat of the oven products to distil tar.

Modern coke ovens, if regularly heated, well constructed, and fitted with self-sealing doors, are excellent gas manufacturing plant. There is no theoretical reason why volume and thermal yields should not be as good as in the best horizontal retort practice. It has, in fact, been proved that such full yields are obtained in practice with modern installations. Actually, the results are better than with average horizontal retort installations, because the inert content of coke oven gas is lower. This is due to the fact that the cumulative air inclusion when a number of retorts are charged is relatively greater than that occurring in the charging of large-capacity ovens. In the past there has generally been a false impression as to the yield of gas obtained in coking practice. This has been due to the lack of measuring facilities on coking plants, and to the adoption of conservative figures based upon very old returns given for gas-works plant. Thus it has been common to assess the yield of gas in Durham coke ovens as 10,000 c.ft. of gas per ton, whereas the volume has been nearer 12,000 c.ft. even with old ovens, and is nearer 12,000 c.ft. per ton of Durham coal in the case of modern installations.

Discussion on Refractory Materials.

The following discussion took place at a meeting of the Yorkshire Junior Gas Association in Bradford on Jan. 18, following a paper by Dr. J. A. SUDGEN, of Leeds University (see last week's "JOURNAL," p. 212).

The PRESIDENT (Mr. F. Firth), inviting discussion and questions, said that Dr. Sugden had dealt with spalling and hot patching and jointing materials, all of which were matters with which those engaged on the works were familiar—at any rate with the difficulties associated with them. Experiences by members would be informative and helpful to others.

Mr. N. G. APPLEYARD (Leeds), in regard to scurfing of retorts, said he was concerned with some horizontal retorts, of fireclay, which had been working about 1800 days. After scurfing they had found some difficulty in discharging them. They got an electrically-driven spraying machine, and sprayed a form of fire cement into the cracks of the retort itself immediately after scurfing, and while still quite hot. As to spalling, it would be interesting to hear if Dr. Sugden had had any experience with silica retorts and horizontal stoking machinery.

Dr. SUGDEN, in regard to the behaviour of silica as compared with fireclay, said that the tendency to spall with silica was greater owing to the rapid expansion which took place. The comparative behaviour of the two depended largely on the relative reversible expansions. The difficulty in applying hot patching material was that it so quickly dried up and became non-pliable.

The PRESIDENT said he was recently at a meeting in London where two eminent people in the refractories world entered into a discussion on hot patching. One of them leaned towards the findings of the Joint Refractories Materials Research Committee, that the incorporation of 7 p.ct. of glass would be useful for hot patching materials. The other had taken the opposite stand, and argued that anything which would tend to fuse—as glass—would be detrimental, and that probably the result might be worse than the original trouble. This gentleman suggested for hot patching an unfired ground quartz mixed with a glue. The question was also raised as to the possibilities of estimating the conversion of a silica material optically. Dr. Sugden had mentioned that the iron chlorides and sodium chlorides attacked the side of the retort and formed a glassy surface, and there was a different coefficient of expansion between the retort material and the back of the surface.

Dr. SUGDEN, replying to Mr. Firth, said the question as to the kind of jointing material was a controversial one. The broad principle would be to maintain as near as possible uniformity of structure—the jointing material should have, as far as possible, the structure of the material which was to be joined, but at the same time the jointing material must have a certain amount of wetting effect before it would stick. To get that effect one added a certain amount of flux. This, of course, would reduce the refractoriness of the mixture; and it all boiled down to a matter of a necessary compromise—how much one could get the material to melt and wet and yet retain enough rigidity to stay as a jointing material. Mr. Firth's observation as to the use of the unfired quartz was very interesting. If they took fireclay and used it as a jointing material, it would contract when heated up. If they mixed with it a certain amount of unconverted quartz, this would make up for the contraction of the fireclay. On the question of filling a joint, if one could once force into the gap material which would then expand, this would be secure. The thermal expansion of a jointing material was important; it must more or less match the material on which it was being put in coefficient of expansion. The question of the estimation of the silica optically was interesting. There were two or three ways of estimating the amount of quartz, tridymite, or cristobalite in a brick. One might use the density as a means of determining how much quartz had been converted, but, owing to the fact that—as shown in his paper—the 2·27 tridymite was very close to the 2·33 of the cristobalite, the possibility of experimental error involved in this determination was too large compared with the difference in the densities, and one could not estimate the amount of tridymite and cristobalite from the density. The optical properties of tridymite and cristobalite differed sufficiently, according to some workers, to enable quantitative analysis to be made. Claims had been made that the composition of silica material might be determined from the shape of the thermal expansion curve. Work done at Leeds had shown, however, that the volume changes at the transition points did not appear sharp enough in the expansion curve to warrant quantitative interpretation.

Mr. C. H. CHESTER (Wakefield), speaking of spalling, remarked that, in a new bench of horizontal retorts which had been installed in 1905 at the works with which he was associated, they noticed, after the first complete year's working, that the majority of the retorts had "come away" to a depth of about half-an-inch. When they put the first set down they noticed a number of cracks in the retort which, at first sight, looked as though it was ready to fall to pieces, but examination showed that they were simply surface cracks. It seemed to be largely a question of the method of treatment. They came to the conclusion that if, while the retorts were cold, they filled them with a suitable fire cement which the makers provided to match the retort (the whole lot then being whitewashed over with this same cement once per year) they would have no further trouble. This had proved to be the case, and up to date had been a definite cure for that particular trouble. Mr. Chester added that he was speaking of a very dense retort—they had some other retorts of a more porous fireclay which did not appear to yield so well to this treatment, but spalling in their case was not so noticeable. Mr. Chester said his observations in the matter led him to wonder whether a firebrick retort would be better if the brick were more porous than was generally supplied at present.

Dr. SUGDEN said there might be something in the latter point, but, of course, one could not go on increasing porosity indefinitely, because by so doing, one decreased the conductivity. It was, as in the jointing material, a question of compromise. If one had it porous enough to eradicate spalling, it might become non-resistant to abrasion; and if porosity was increased far enough, it would become permeable.

Mr. E. CROWTHER (Deputy Gas Engineer, Bradford) said that at a works with which he had been associated they had been very much interested in the construction of silica vertical retorts in recent years, and had had some rather peculiar experiences. In the first place, they had been very much troubled, after a short period of working, to find the joints were opening out. Hot patching by the gun system was successful in allowing them to carry on working over the winter season; but this system, he felt, was far from being perfect as yet, good as it was in many respects. The shooting system was very good so far as it went, but it was rather expensive; and, to his mind, where it could be avoided, so much the better. The solution of the problem was probably a question of design. In regard to spalling, he felt that probably 50 p.ct. of this trouble—at any rate with vertical retorts—need not really take place, and that a lot of it was due to bad practice. All these matters, of course, were still largely ones of opinion, but he thought there was a tendency to allow the retort to get too cold after scurfing, which did far more damage than letting it get too hot. He considered it ought to be kept hot, at any rate inside, and particularly it should be a little hotter than usual on starting-up, in order that the chilling effect of cold coke might not have too much play. The question of the lining of producers was, to his mind, one of extreme importance. Unless one was prepared to re-line hot—a very unpleasant job—they had to let down and start up again, which was a very long job of about three months or so. Where this could be avoided, it was beneficial both to the life of the setting and to the undertaking's capital expenditure. If they could find a material that would stand up better to the fluxing action of the clinker it would be most valuable. It had, he believed, been suggested that a chrome brick might serve this purpose. It would be interesting if the meeting could know what was the comparative life of a chrome brick as compared with that of the ordinary firebrick in producers and also in water gas generators.

Dr. SUGDEN said it was interesting to him to hear a candid admission that design was perhaps at the bottom of some of the troubles, rather than the refractory itself. In regard to producers, the fluxing action was the problem involved. Dr. Sugden remarked that he would not like to say definitely how the chrome brick would behave, or, for that matter, how any material would behave in any particular case. Before he could give an answer, he would feel compelled to make some kind of laboratory test; and it had always to be remembered that much more work would yet have to be done in laboratory testing, and correlating such testing to plant scale work, before such testing could be of the great value which it should have.

VOTES OF THANKS.

Mr. B. THORPE (Huddersfield) moved a vote of thanks to Dr. Sugden, and the proposition was seconded by Mr. J. W. BAKER (Sheffield).

Thanks were voted, on the motion of Mr. J. W. WOOD, M.Sc., seconded by Mr. D. T. LIVESEY (Doncaster), to the Bradford Gas Committee and the Gas Engineer (Mr. E. J. Sutcliffe) for facilities provided for the meeting.

New Catalytic Processes for the Utilization of Coal-Tar Crudes.

By A. O. JAEGER.

[From a Paper before the Second International Conference on Bituminous Coal, Pittsburgh.]

The purpose of this discussion is to focus attention on some extremely interesting possibilities for the chemical industry arising from the development of new and very effective processes for purifying various crude aromatic hydrocarbons, such as light-oil fractions, crude naphthalene, and, particularly, crude anthracene by selective catalytic oxidation. This is accomplished by the use of new classes of contact masses which, by selective action, remove part or all of the impurities.

DIFFICULTIES OF ANTHRACENE PURIFICATION.

To illustrate the usefulness of such new catalytic processes may be cited the difficulties involved in the recovery of anthracene of high purity from coal tar, as hitherto practised. This has long been one of the most baffling problems in the coal-tar distillation industry. Even yet the most important source for the technical recovery of anthracene is anthracene oil or green oil. This is the last fraction coming over in the distillation of coal tar, and is collected in the range of temperature of 270°-400° C. From this fraction 6 to 10 p.ct. is recoverable as crude anthracene of 15 to 30 p.ct. anthracene content. The recovery of the crude anthracene from the green oil fraction is made by filtration, centrifuging, and cold and hot pressing. By washing as well as possible with solvent naphtha or creosote oil, the adhering oil and other impurities are to some extent removed, and an enriched product is obtained, which, however, still contains only 30 to 50 p.ct. of anthracene.

Many difficulties are encountered in the commercial purification of such grades of crude anthracene to such an extent that the product is sufficiently pure for the production of anthraquinone, which is the most important intermediate in the dye-making industry for alizarins and vat colours.

The impurities which must be removed in this purification are many and various. Phenanthrene, acenaphthene, fluorene, carbazole, methylanthracene, acridine, &c., are all present, as well as, in many cases, high-boiling paraffins such as ecosane, decosane, and the like. Other impurities are sometimes present in small amounts, and the relative proportions of the different impurities will vary considerably with the nature of the coal tar from which the crude anthracene is produced. The impurities present in largest quantities, however, are carbazole and phenanthrene. Though carbazole is not the most troublesome contaminant, its removal is a critical problem. The paraffins and the alkyl derivatives of anthracene, however, are not only more troublesome to remove, but are also more harmful to the quality of the product.

Many processes have been worked out for the further purification of the various grades of crude anthracene. As examples may be mentioned the removal of contaminants by washing or by re-crystallization. Since carbazole behaves much like anthracene in solubility in most solvents and in vapour pressure, special treatments have been devised for its removal, such as conversion to potassium salt by treatment with potassium hydroxide, conversion to nitroso compounds, formaldehyde derivatives, and so on. One solvent has been found which is somewhat specific for the removal of carbazole, and that is pyridine.

All these processes are expensive and slow. Many require several repetitions in the principal operations, and on that account are high in labour cost. They entail relatively high health hazards, since the crude anthracene contains many compounds which are very irritating to the skin and may even initiate cancerous growths. The processes are also very wasteful, since only certain grades of crude anthracene can be used. For example, certain coke oven tars produce a crude having less than 24 p.ct. and sometimes as low as 14 to 16 p.ct. anthracene content. Such crudes cannot be economically worked up by the processes hitherto used. Moreover, cannel coal or other highly paraffinoid coals, when cracked, result in tar fractions containing relatively large amounts of paraffins. These contaminants cannot be satisfactorily removed by any of the methods of purification hitherto known, so that the raw materials from such tars have been useless for making intermediates for dyes.

These considerations are largely responsible for the fact that, in spite of the immense production of coke, and, therefore, of coal tar, in the United States, all efforts to make these domestic sources of anthracene economically available have failed of success. This is a serious handicap to the domestic alizarin and vat dye industries which are now in a condition of intensive development. The patent literature shows that the failure has not been due to the lack of well-directed efforts to overcome these difficulties.

DISADVANTAGES OF PRESENT METHOD FOR ANTHRAQUINONE.

As a result of the lack of highly purified anthracene in large enough quantities and at a sufficiently low cost, the anthraquinone used in this country as intermediate for dyes has been made almost exclusively by the synthetic process. This synthesis is accomplished in two steps—namely, the condensation of phthalic anhydride with benzene by means of aluminium chloride and the ring closure of the benzoyl benzoic acid so produced. Though the process is simple at first glance, certain serious difficulties are inherent to it: (1) Aluminium chloride of sufficiently high quality is very expensive and difficult to store and handle; (2) in the condensation hydrochloric acid is produced, involving all the difficult problems due to its great corrosive action; and (3) benzene is used in much more than theoretical quantities involving the usual difficulties and expenses in its recovery ready for re-use.

Altogether, it may be said that, though this synthetic process for making anthraquinone has served as a temporary means of overcoming the lack of suitable material for the dye industry, it cannot be called a very satisfactory permanent solution of the problem.

CERTAIN NEW PROCESSES.

Certain new processes have been devised for purifying various coal-tar crudes, and these processes are dealt with in this discussion. When applied to the purification of crude anthracene, almost any grade can be utilized, even down to 12 to 15 p.ct. anthracene content. Such low-grade crudes are entirely out of the question for utilization in any of the processes hitherto known. The processes may be briefly outlined as follows:

Crude anthracene is vaporized and mixed with air, preferably by spraying the crude into heated air. The vaporized mixtures are passed over a suitable catalyst which favours total combustion of the heterocyclic impurities and aliphatic compounds. The anthracene is not attacked to any considerable extent.

The variety of catalysts which will accomplish this selective oxidation is very large. For, surprising as it may seem, the writer has found that carbazole and other nitrogenous compounds, normally considered very stable, are substantially quantitatively burned when subjected in the vapour phase to proper reaction conditions in the presence of suitable catalysts. At the same time, these conditions do not result in any considerable oxidation of the aromatic hydrocarbons present with the heterocyclic compounds and other impurities. The product of such a catalytic purification is a high-grade anthracene containing varying amounts of phenanthrene as almost the only impurity. Even the phenanthrene may be very nearly completely removed by suitable choice of catalyst, but it is difficult to remove all the phenanthrene by catalytic oxidation without seriously reducing the yield in anthracene, since, though phenanthrene is more sensitive to oxidation catalysis than anthracene, its sensitivity is far less than that of carbazole and the other impurities.

Therefore, most catalysts which reduce the phenanthrene to small amounts will burn up a considerable amount of the anthracene. How much phenanthrene should be removed by catalysis will depend to a large extent on the market for phenanthrene and its derivatives. In solubility in many well-known solvents, phenanthrene differs very definitely from anthracene. It is therefore possible by simple and economical re-crystallization processes, or even only by washing with many solvents, to separate the anthracene and phenanthrene practically completely, so that an anthracene of 90 to 99 p.ct. is easily obtained. Moreover, in the subsequent utilization of the anthracene by oxidation to anthraquinone, the small amount of phenanthrene remaining is necessarily destroyed. In these re-crystallization and washing processes phenanthrene can be recovered in very pure condition from the mother liquors.

It is seen that as a result of this catalytic method of purifying the anthracene, not only is the main product obtained in highly purified condition, but bye-products, such as phenanthrene, of high potential value can also be obtained in almost any required degree of purity. Since by these processes phenanthrene of high quality is made available at very reasonable costs, it is certain that methods for its utilization will be developed along the lines of making new derivatives in the dye and pharmaceutical fields.

As noted above, the paraffin impurities in the crude anthracene are completely removed in these catalytic processes. This

attack on the paraffin extends even to alkyl radicals attached to such nuclei as the anthracene grouping. This attack probably proceeds by stages in that the alkyl radicals are first oxidized to carboxyl groups and the latter lose carbon dioxide, so that the alkyl groups are completely removed. In the old processes for purification of anthracene, removal of alkyl derivatives of anthracene was the most difficult problem and was never completely solved. This was particularly unfortunate in that alkyl anthracenes were the most deleterious impurities which could be present in the final product. The overcoming of this difficulty by the catalytic purification processes by choice of suitable conditions for the oxidation and suitable catalysts is one of the most important phases of the improvement accomplished.

Application to Partially Purified Crudes.

While the new catalytic purification processes have been discussed as yet only as applied to the crude anthracenes, it is evident that a semi-purified anthracene would serve as excellent material for such processes. There is a large variety of cheap solvents available which will remove the phenanthrene from crude anthracene. The semi-purified product obtained from recrystallization or washing with such solvents is eminently suitable as a material for the catalytic purification processes, since practically the only remaining impurity in large quantities is carbazole, which is completely removed in this catalytic procedure. The product of such a course of treatment is necessarily an anthracene of extremely high purity.

It has been emphasized throughout the discussion that carbazole is destroyed in the course of catalytic purification. It may be desirable at times that the carbazole be recovered, at least in large part. One class of solvents has long been known which will remove carbazole from anthracene. This is pyridine and pyridine-like compounds. In cases where the recovery of the carbazole is desired, a preliminary treatment with pyridine and its derivatives could be used, and the semi-purified anthracene obtained could then be subjected to the catalytic purification. The carbazole recovery would carry with it the phenanthrene in large part. But not only is a separation of the two possible by use of known solvents, but by proper choice of catalysts and conditions for the selective catalytic oxidation, the two could be separated so as to leave a highly purified phenanthrene. Later in this discussion, attention will be called to a new development in the way of solvents which have a selective action in the removal of carbazole and which can be used by the procedure just outlined.

The last two phases of the usefulness of the new catalytic purification processes which have been discussed have dealt with the use of semi-purified anthracene as a material. When such anthracene is used, it is not necessary to stop the oxidation at the stage of producing purified anthracene and then resume it later to make from the anthracene an anthraquinone by catalytic oxidation. The two stages in the oxidation can be combined either by passing the vapours over two layers of catalyst in the same converter or by taking the vapour of purified anthracene from the first converter and passing it through a catalyst, properly selected for its oxidation to anthraquinone, in a second converter. In either of these two methods of combining the purification with the oxidation in vapour phase, the first layer of catalyst is properly selected to purify the anthracene, and the second layer of catalyst is selected for its oxidation to anthraquinone, and by proper choice of the two catalysts an absolutely chemically pure anthraquinone can be produced in yields of 90 p.ct. of theory or higher.

As another example of the usefulness of selective catalytic purification, phenolic substances and other impurities present in crude naphthalene fractions of coal tar can be removed so as to produce a very high grade naphthalene. The naphthalene can then be directly oxidized to such valuable products as α-naphthaquinone, phthalic anhydride, maleic acid, and the like without an intermediate isolation of the naphthalene itself.

Other fractions of coal tar may also be either completely purified or greatly improved by similar treatments. Crude benzene and other crude light-oil fractions may be so treated as to remove, at least in large part, aliphatic, alicyclic, heterocyclic, and unsaturated compounds which may be present as impurities.

Classification of Catalyst Components.

Though it is possible to use any suitable oxidation catalyst having a selective oxidizing effect on impurities, the writer has found that the most effective catalysts are the so-called "stabilized" ones. These are catalysts which contain, in addition to the specific catalytic components, compounds of the alkali metals, alkaline-earth metals, and some earth metals characterized by the fact that their oxides are difficultly reducible. These stabilizers exercise a moderating action on the catalyst and prevent or moderate its activity in oxidizing such organic compounds as anthracene, naphthalene, phenanthrene, acenaphthene, benzene, toluene, and the like.

Other components, while somewhat active catalytically, are not highly specific in their action, and may be used in combination with the stabilized catalyst. In such cases these components appear to tone or promote the action of the stabilizer present, and in this manner highly efficient selective action of the catalyst is induced. These components are therefore termed "stabilizer promoters."

Complex Compounds as Catalysts.

The manner in which the catalytically active components are associated with the other components in the mass may affect the action of the mass very considerably. Mixtures of the various elements may be used, but it has also been found that combinations of the elements in the form of base-exchange substances, which may or may not be siliceous base-exchange substances, are also very efficient catalysts for the purposes under discussion.

In many cases it may be possible by variation of the conditions of the catalytic purification to use the same catalyst for different purposes. In other cases the same starting material may be made to yield different main products by varying such conditions as the amount of air or other oxidizing gases, the time of contact, the rate of loading, &c.

Trade Notes.—(*Continued.*)

"Bamag" Precision Gears.

Messrs. Bamag-Meguin (G.B.), Ltd., of Broadway Buildings, Westminster, S.W. 2, have published a leaflet describing their precision gears.

Waterless Holder for Gas Light and Coke Company.

The Gas Light and Coke Company have recently placed the order with Messrs. Robert Dempster & Sons, Ltd., Koss Mount Iron Works, Elland, for a waterless gasholder (M.A.N. type) of 4 million c.ft. capacity, to be erected at the Harrow Gas-Works.

New Type Tully Plant for Irish Works.

One of the new type mechanically operated Tully plants has been started to work at the Comber Gas-Works, near Belfast, being the first of this particular type to be installed in Ireland. The gas-works are the property of Mr. T. D. Hamilton, of Belfast, the popular Irish representative for Alder & Mackay meters.

Scottish Bard and the Carron Company.

On Jan. 25, 171 years ago, Robert Burns was born, and the Carron Company, of Carron, Falkirk, have chosen this opportune time to distribute to their business friends a leaflet which makes reference to the visit paid to the Carron Works by Scotland's immortal Bard. The leaflet is attractively produced, and shows a photograph of Burns' birthplace in Alloway, near Ayr, together with a portrait of the poet.

New Carbonizing Plant for Grangemouth.

The Grangemouth Gas Commissioners have decided, on the advice of their Engineer and Manager, Mr. Cuthbert, to instal a vertical retort installation, and his report also recommends the renewal of steaming, condensing, washing, and scrubbing plant, and the whole scheme has been approved. Messrs. West's Gas Improvement Company, Ltd., have been entrusted with the contract for the carbonizing plant.

Flexible Joints for Cast-Iron Pipes.

The Stanton Ironworks Company, Ltd., near Nottingham, have acquired the sole British rights of the "Victaulic" joint for use with cast-iron pipes. The "Victaulic" joint is already known for giving flexibility to a pipe line at each of the joints, and it is anticipated that in the hands of the Stanton Company this joint will be extensively adopted for cast-iron pipes, thereby introducing flexibility into cast-iron mains. In connection with the Stanton Company's well-known spun pipe a special form of "Victaulic" joint has been designed which obviates the use of the housing.

Further Extensions at Preston.

The Preston Gas Company have decided to extend their new Lostock Hall Works, and Messrs. Drakes, Ltd., of Halifax, have been instructed by Mr. Samuel Tagg (the Engineer and Manager) to proceed with all speed with a further continuous vertical retort installation consisting of 6 beds of 8 retorts, each of a nominal capacity of 4½ tons per retort per diem, thus making a total of 10 beds of 8, having a guaranteed coal throughput of 360 tons per day irrespective of steaming. The contract also comprises waste-heat recovery boiler, extensions to the coal-handling plant and the telpher plant for coke-handling, together with the necessary steel framed brick-filled buildings to house the plant, which has to be completed and gas-making by February, 1931.

Overseas Opportunities.

[From the Board of Trade Journal.]

South Africa.

27 *Gas Cookers.*—H.M. Trade Commissioner at Johannesburg reports that the Stores Department of the City Council of Johannesburg is calling for tenders, to be presented in Johannesburg by Feb. 8, 1930, for the supply of 27 gas cookers. Contract No. 325. Firms desirous of offering gas stoves of British manufacture can obtain further particulars of this call for tenders upon application to the Department of Overseas Trade, 35, Old Queen Street, London, S.W. 1. (Ref. B.X. 6068.)

Aldershot Gas, Water, and District Lighting Company.

The Annual Meeting of the Aldershot Gas, Water, and District Lighting Company was held yesterday (Jan. 28)—Mr. R. W. EDWARDS, J.P., Chairman and Managing Director, presiding.

Directors' Report.

The Directors' statement of the Company's accounts for the year ended Dec. 31, 1929, shows that the revenue from all departments was £251,023, and the expenditure £190,595, leaving a surplus of £60,428. After allowing for dividends on consolidated preference stock, interest paid to bank, and on redeemable mortgage bonds and debenture stock, as well as for the statutory dividends paid for the half-year ended June 30, 1929—viz.:

£5 19s. 6d. p.ct. per annum on the "A" stock,
£4 9s. 6d. p.ct. per annum on the "B" stock, and
£5 p.ct. per annum on the "C" stock,

the Directors recommend the full statutory dividends of £6 4s. p.ct. per annum on the "A" stock; £4 14s. p.ct. per annum on the "B" stock, and £5 p.ct. per annum on the "C" stock for the latter half of the year—all *less* income-tax.

Chairman's Address.

GAS.

The CHAIRMAN said: As I stated at our annual meeting on Jan. 30, 1929, the price of gas was reduced from the preceding Christmas by 0·6d. per therm. Then from Midsummer by another 0·6d., and again from Christmas last a further 0·4d. per therm, so that you will observe the price of gas has been lowered by 1·6d. per therm, equivalent to 8·4d. per 1000 c.ft., and of this 6·3d. reflects itself in the accounts now submitted.

Since the general strike, the price of gas (including the 0·4d. per therm from Christmas last) had been reduced by almost 1s. 7d. (1s. 6·9d.) per 1000 c.ft. You will, therefore, see that every consideration has been given to the cheapening of gas, and this, we hope, will have the effect of encouraging the public to use it much more comprehensively.

The net sales of gas for the year show an increase of 5 p.ct., and the following apparatus was added during 1929:

Cookers	539
Fires	916
Hot water	400

The amount received for residuals represented 60 p.ct. of the cost of coal, as compared with 53·5 p.ct. in 1928, and 56·6 p.ct. in 1927.

The yield in liquid products, calculating for ammoniacal liquor of 8 oz. strength, was 47·36 gallons per ton of coal carbonized, as compared with 45·7 in 1928 and 43·7 for 1927.

WATER.

The progress of this Department has been good. The maximum net domestic consumption per head of population on any one day during 1929 was 25·7 gallons, as compared with 27·6 in 1928, and 34·8 in 1927.

The average net domestic consumption per head per day was 14·5 gallons, as compared with 15·26 for 1928, and 15·79 for 1927.

The rainfall for the year was 26·91 in., as compared with 29·17 in 1928.

ELECTRICITY.

This Department has shown further development during 1929. The advance in sales was 16·2 p.ct., and in this the increase for other than lighting was 35·3 p.ct.

The following apparatus has been fixed during 1929:

Lamps	5690
Motors	11
Fires	180
Cooking apparatus	23
Sweepers	76
Irons	57
Miscellaneous	59

The price for lighting was reduced from Christmas, 1928, by 0·3d.; by 0·2d. from Midsummer; 0·2d. from Michaelmas; and a further 0·2d. per unit from Christmas—in all 0·9d., of which 0·7d. reflects itself in the accounts submitted.

The price for all purposes other than lighting has also been reduced by 1d. per unit during the same period.

CAPITAL.

For the three undertakings the amount of capital authorized is £1,206,367. Of this there has been received £888,373. Adding a debit balance of £98,774, we arrive at a total of £987,147, from which £40,989 (added on consolidation in 1909) is deducted to arrive at a net figure of £946,158. After deducting depreciations of £9591, the net capital expenditure during the year was £29,457.

GENERAL.

I much regret to record that in consequence of the revision of our assessments in the various districts the increase in rates for 1929 was over £5500.

We have added a total number of consumers during the year of 958, making an increase of 8411 in six years. New showrooms have been opened at Fleet, Hindhead, and Haslemere.

As I have stated on previous occasions, the co-partnership scheme is appreciated. For the year ended June 30, 1929, the bonus was 6·5 p.ct., as compared with an average rate for the year ended June 30, 1928, of 6·8 p.ct. The basis of the bonus is the highest price of gas over the co-partnership year, and though reductions had taken place during the twelve months ended June 30, 1929, the bonus was at a lower rate in consequence of the reversion to pre-strike (1926) standard price. The sports club and hospital and benevolent funds, in collaboration with the various hospitals and convalescent homes, have done excellent work during the year—respectively for the recreation of the employees and the relief of those who have been ill or injured.

The Directors pay full tribute to the principal officers—the Chief Engineer, Secretary, and Chief Accountant—and to all officials and employees in their respective departments, for the devotion and zeal which has been given to the Company in the execution of their duties. Generally, the outlook is promising, for, fortunately, the Company has a wide area over which its business can be developed. I now draw my address to a conclusion in moving the following resolution:

> That the Directors' report, with the statement of accounts for the twelve months ended Dec. 31, 1929, be and are hereby adopted, and that the dividends as therein recommended be and are hereby declared to be forthwith payable to the proprietors.

The resolution was seconded by Mr. T. A. BRADDOCK (Deputy Chairman), and carried unanimously.

Mr. Braddock was re-elected a Director of the Company, and Mr. Arthur E. Cutforth, F.C.A., was also returned as Auditor.

The proceedings closed with a vote of thanks to the Chairman, Directors, and staff.

Parliamentary Intelligence.

[From Our Special Correspondents.]

House of Lords

Special Orders.

Special Orders made on the application of the Borough of Kendal, the Barry Urban District Council, and the Spalding Urban District Council have been laid before the House and referred to the Special Orders Committee.

House of Commons.

Special Orders.

Special Orders promoted by the Barry Urban District Council and the Spalding Urban District Council have been presented to the House and ordered to lie upon the Table.

Private Bills.

The following Private Bills dealing with gas were read a first time on Thursday last: Brighton and Hove Gas Bill, South Staffordshire Mond Gas Bill, and South Yorkshire and Derbyshire Gas Bill. These Bills have been referred to the examiners.

A Special Resolution has been deposited by the Staveley Gas Light and Coke Company, under Standing Order 63, which requires a special resolution of the Company in approval of a Bill prior to its introduction.

Legal Intelligence.

Halstead Gas Company, Ltd.

In the Chancery Division, the Halstead Gas Company, Ltd., applied to Mr. Justice Maughan for confirmation of the extension of the objects of the Company.

Mr. CHRISTIE (for the Company) said the concern was engaged in supplying Halstead with gas, and the extension asked for was to allow the Company to carry the supply to neighbouring villages, some of which had a supply of gas and some of which had not. Those that had a supply would be more conveniently served by the Company.

His Lordship granted the application.

Ewart & Son, Ltd.—The report of the Directors to be submitted at the 29th ordinary general meeting of shareholders states that the net profit for the year ended Dec. 31 last was £58,828, to which has to be added the amount brought forward from last year, making a total of £79,580. The Directors recommend that dividends be paid at the same rates as last year, and that a further sum of £10,000 be placed to the dividend equalization fund, which fund may be used in future years for dividends, and that the balance be added to the carry forward. The final dividend on the ordinary shares makes, with the interim dividend already paid, 41 p.ct. for the year.

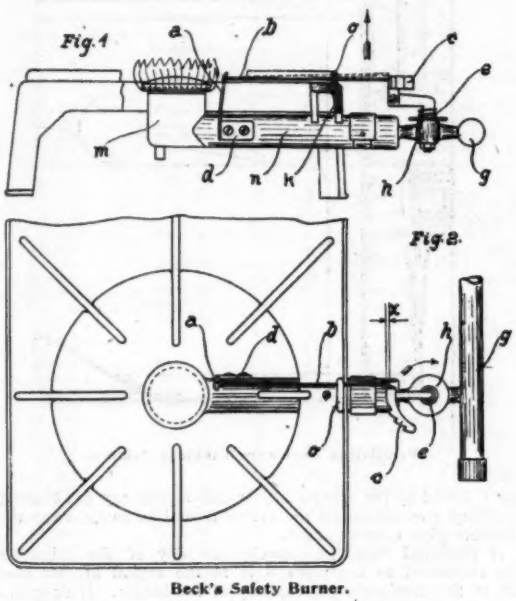
Register of Patents.

Safety Device for Gas Burners.—No. 300,966.

BECK, K., of Bad Homburg vor der Höhe.

No. 33,874; Nov. 19, 1928. Convention date, Nov. 21, 1927.

The embodiment of this invention is illustrated by way of example in the accompanying drawing, in which fig. 1 shows in side elevation, partly in longitudinal section, a gas burner apparatus of the common type fitted with the safety device. Fig. 2 is a plan view.



Beck's Safety Burner.

On the pipe *n* of the burner *m* is fixed (for instance by means of a tongue *d*) the expansible member consisting of a bi-metal strip *a*. On the upper end of this bi-metal strip *a* is secured a push rod *b* which is guided freely in a vertical oblong lug or eye *o* on the rim of the gas apparatus. Between the pipe *n* and the gas supply pipe *g* is interposed an automatically closing gas cock *h* on the handle of which, controlled by spiral spring *e*, is mounted a toothed sector *c* at such a level that, when the push rod *b* is shifted to the right, it extends into the range of this toothed sector.

To bring the projecting device into the operative position, the handle of cock *h* is turned against the action of spring *e* into the position indicated in the drawing, and held by hand in this position. The burner is then ignited. By the instantaneous expansion of the strip *a* the rod *b* is shifted to the right the distance *x*, whereupon the handle may be released. The handle rotated by the action of spring *e* is then held locked by the rod *b*. When the flame is extinguished the bi-metal strip *a* contracts and pulls the rod to the left, whereby the handle is released and the tap turned off by the action of spring *e*. If the flame is to be made smaller, the rod *b* is slightly lifted at its free end, moving to the oblong lug or eye *o*, and the cock begins to close. The rod *d* is then lowered so that it engages with the selected one of the teeth of the sector *c* and holds the cock in partly opened position so that the burner burns with a small flame.

Rich Gas from Lean Gas.—No. 301,459.

METALLGESELLSCHAFT AKTIENGESELLSCHAFT, of Frankfürt-on-the-Main.

No. 33,295; Nov. 14, 1928. Convention date, Nov. 30, 1927.

This invention relates to supplying towns or villages from a distance with rich gas of high calorific value obtained from poor gas, for example, water gas. The pressure required for the conveyance of gas of high calorific value is utilized at the same time for applying one or more successive physico-chemical improving treatments to the gas, whereby the calorific value of the gas in question is increased.

Water gas, obtained from lignite, is first subjected to a preliminary purification. This may be effected by the decomposing thermal reactions which are advantageously set up by internal heating, for example, by the combustion of a portion of the gas with oxygen, or by the employment of adsorption media, such as active charcoal, silica gel, and the like. Both measures may be combined with advantage. The partially purified gas is then subjected (preferably with the aid of catalysts) to the known homogeneous water gas reaction, according to the formula:

$$CO + H_2O = CO_2 + H_2 \text{ (first stage of improvement).}$$

The reaction mixture, after being on occasion freed from surplus carbon dioxide, is thereupon further treated up in accordance with the following equations:

$$\left.\begin{aligned} CO + 3H_2 &= CH_4 + H_2O \\ CO_2 + 4H_2 &= CH_4 + 2H_2O \end{aligned}\right\} \text{(second stage of improvement).}$$

The originating gas is compressed in a suitable manner before or during the course of the improving process. This compression may, for example, be effected at the outset, in which event the preliminary purification—for example, decomposition treatment with active charcoal—and all further stages of the process are carried out under pressure; or it may also be carried out during the improving process, before the second stage thereof. In such case the removal of the carbon dioxide preceding this reaction is not effected chemically, but by washing out with water under pressure. The carbon dioxide thus recovered can be utilized with advantage by feeding it—preferably in the combustion zone of the water gas producer—together with the oxygen and steam mixture, or the mixture of steam and air enriched with oxygen, from which the water gas is blown.

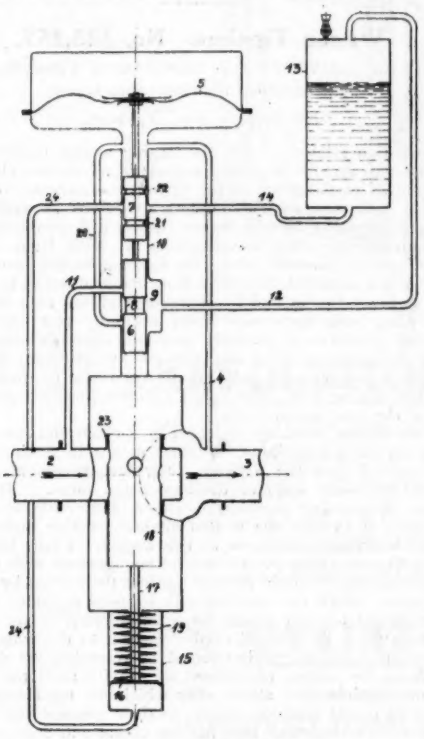
Gas Pressure Regulator.—No. 303,903.

BERGFELD, K., of Berlin-Halensee (Wilmersdorf).

No. 1123; Jan. 12, 1929. Convention date, Jan. 12, 1928.

The object of the present invention is an improved regulator for maintaining constant the determined pressure of gas in a supply main. The pressure of the gas to be regulated acts on a liquid, and the liquid pressure so produced acts upon the stop valve.

The accompanying drawing shows a convenient embodiment.



Gas Pressure Regulator.

The gas flows in the direction indicated by the arrows through the conduits 2, 3, between which the stop valve 23 is fitted. Fluctuations in the pressure of gas in conduit 2 will immediately occur also in conduit 3, and from here will be transmitted through the conduit 4 of the control device 5 (membrane or bell). With the membrane 5 two control pistons, slide valves, or the like, 6 and 7, having recesses 8 and 21, 22, are rigidly connected, and these move in the cylinder 10 according to the oscillations of the membrane 5 and form the connection of the conduits 11, 12, or 20—12 for the inlet pressure and 14, 24 for the pressure fluid. On an increase of pressure occurring in the conduits 2, 3, the membrane 5 is lifted, and with it the control pistons 6, 7. The inlet gas from conduit 2 can, through the conduits 11, 12, which are connected by the recess 8 of the piston 6, exert pressure on the fluid in the receptacle 13. The fluid then further transmits the pressure through the conduits 14, 24, which are opened somewhat later than the conduits for the inlet pressure through the recess 21 of the piston 7 to the piston 16 in the cylinder 15. The stop valve 18 is rigidly connected with the piston 16 and thus throttles the flow of gas on pressure being exerted on the piston 16, and so diminishes the pressure.

In the inverse case—namely, when the pressure in the conduits 2, 3, falls—the membrane drops, and with it the control pistons 6, 7. The control piston 6 then establishes connection between the conduits 20 and 12 while the piston 7 through the recess 22 connects conduits 14 and 24. In consequence of the release of pressure in the receptacle 13, the fluid under pressure then rises and thereby the piston 16 is released. The spring 19, therefore, presses the piston 16 downwards, whereby the stop valve 18 is opened again and the gas pressure in conduit 3 again rises.

The control devices 6, 7 are so constructed that the device 6 of

the piston which controls the inlet pressure is opened earlier than the device controlling the pressure fluid. The stop valve 18 is arranged to open slowly and close quickly and the slowness in opening may be realized by the fact that the spring 19 has a slow function in overcoming the fluid pressure at the head of the piston and in the conduit 24.

Securing Meter Diaphragms.—No. 322,976.

SMITH, E. W., and SMITH METERS, LTD., both of Kennington Park Road, S.E. 11.

No. 9048; March 20, 1929.

The primary object of this invention is the provision of means for securing the edges of the diaphragm leathers to their pan rims in such a manner that the meter may be worked well above normal speed without liability of destroying the diaphragm leathers.

The meter is provided with diaphragm securing means of the type in which the edge of the diaphragm is held between rounded clamping members. The edge of the pan is turned outwardly or inwardly in rounded fashion, and there is a clamping ring of rounded edge form, so that when the pan rim and the ring are placed together with the edge of the diaphragm between them, the diaphragm is held in a Y-like clamp.

The patentees make no claim *per se* to forming the pan rim and the clamping ring with rounded edges; but it is new, to the best of their knowledge, to use this construction in gas meters of the high-capacity type. They have found the combination to give excellent results.

Wagon Tipplers.—No. 323,257.

WEST, E., and WEST'S GAS IMPROVEMENT COMPANY, LTD., both of Miles Platting, Manchester.

No. 27,412; Sept. 24, 1928.

This invention relates to side discharging wagon tipplers, and has for its object to provide improved automatic means for clamping the wagon upon its platform before the tipping commences; the arrangement being such that, notwithstanding variations in wagon heights, the clamping must be effected before tipping can commence.

The main driving arms are suspended by links from a fixed fulcrum, the ends of the links above the fulcrum having one end of the clamping levers attached thereto, a link being attached to each lever between its pivotal point and its clamping end and to a driving arm.

The driving arm suspension links normally rest against stops. The tipping platform is pivotally mounted upon the driving arms, the pivot being disposed to one side of the platform so that the weight of the wagon and platform always tends to turn the latter towards the driving arm, which has a buffer thereon against which the side of the wagon can bear.

When the driving arms are operated by a chain and sprockets, rope and sheaves, rack and pinion, or other means in a direction to tip a wagon carried upon the platform, their first movement is a pivotal one about the lower ends of the suspension links. During such movement, the tipping platform is raised sufficiently from its support to allow it to turn the wagon against its side buffer, and the top clamp is brought down on to the wagon. Until, however, the motion of the top clamp is arrested by engagement with the wagon, the suspension links remain pressed against their stops by the weight of the wagon. With the top clamp in its final position, the driving arms are forced to turn about the fixed fulcrum of the suspension links, which gives the desired tipping motion to the wagon.

The return of the wagon is effected by reversing the driving gear which allows the wagon to descend by gravity until the suspension links return against their stops, after which the top clamp is opened and the wagon and platform return to their original position. The tipping gear is arranged so that the top clamp will engage any usual height of wagon before tipping commences.

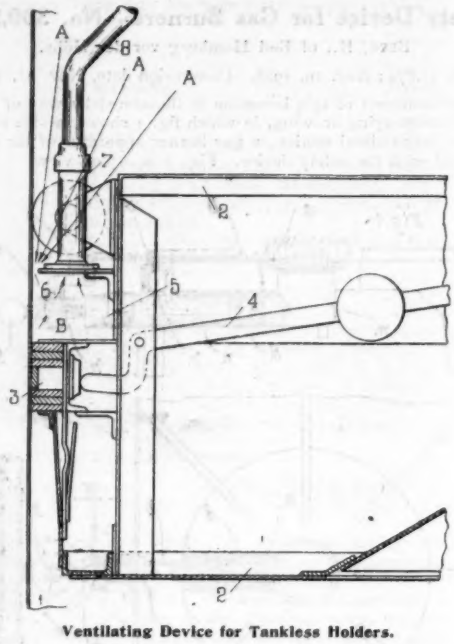
Ventilating Tankless Gasholders.—No. 323,388.

MILBOURNE, R. J., and BEARD, G. F. H., both of Wellington, Shropshire, and DRY GASHOLDERS, LTD., of Victoria Street, S.W. 1.

No. 2274; Jan. 23, 1929.

It is the object of the invention to provide improved means for ventilating tankless gasholders. A confined space is formed just above the packing ring, and means to ventilate this space is provided. In the usual tankless gasholders, state the patentees, there is a piston which is separated from the inner wall of the outer mantel by a certain clearance at the top, and this clearance is filled for part of the depth of the piston by suitable packing means. Accordingly, there is usually an annular or substantially annular space above the packing ring near the top of the piston; and in this case, the patentees form the confined space by a horizontal peripheral extension of the top of the piston, or by providing an annular member parallel with the top so as to extend almost into contact with the inner wall of the outer mantel. For simplicity, it is better that there should be a slight clearance between the edge of the peripheral member and the mantel, though this clearance is not absolutely essential.

In the drawing, the side or wall of a tankless holder is shown at 1, and a sliding piston at 2. This piston is provided with a packing 3 held up against the walls of the holder by means of a counter-weighted lever 4. An annular confined chamber 5 is formed between the piston 2 and the wall 1 of the holder, above the packing 3, by annular plate 6 which extends substantially up to the wall of the holder, and may actually rub against this; but it is preferred that a small space be left. This annular plate 6 is provided with one or more ports around its periphery connected to pipes 7 having flexible connections 8 to an exhauster, so that air or gas in the space 5 will be removed. A circulation of air can be provided through the space 5 by reason of air being drawn in above the



Ventilating Device for Tankless Holders.

piston 2 shown by the arrows A. By this means any gas leaking past the packing 3 as shown by the arrow B will be swept away through the flexible pipe connections 8.

It is preferred that the capacity per day of the exhausters or pumps connected to the pipes 8 is in the region of, for instance, 6 p.ct. of the maximum gas capacity of the holder. If desired, automatic or other gas indicator means may be provided on the pipe 8 or at any suitable place along the pipe circulation, so that the attention of operators is called to the fact that a certain proportion of gas is leaking past the packing 3.

Applications for Patents.

[Extracted from the "Official Journal" for Jan. 8.]

Nos. 1—428.

EBERT, A.—"Gas valves." No. 130.
KOPPERS COMPANY.—"Heating systems for coke ovens." No. 313.
WHITFIELD, C.—"Gas producers." No. 27.

[Extracted from the "Official Journal" for Jan. 15.]

Nos. 429—1120.

BARRETT COMPANY.—"Distillation of tar." No. 980.
GOLDSPINK, G. E.—"Gas meters." No. 816.
KIRKEWHITE ENGINEERING COMPANY, LTD.—See Goldspink, G. E. No. 816.
MAIN, LTD., R. & A.—"Gas cocks." No. 1018.
ORAM, J.—"Gas burners." No. 1050.
WORTLEY, G. W.—See Main, Ltd., R. & A. No. 1018.

[Extracted from the "Official Journal" for Jan. 22.]

Nos. 1121—1860.

ASHLEY, F. W.—"Air or gas compressors." No. 1187.
BRAIN, T. H.—"Gas fires and cookers." No. 1858.
BREISIG, A.—"Alternating gas producers." No. 1462.
BRITISH THOMSON-HOUSTON COMPANY, LTD.—See Ashley, F. W. No. 1187.
GADD, A.—"Gasholders." No. 1254.
GREENWOOD, H. V.—"Gas-heated hot water boilers." No. 1383.
GUNNING, J.—"Gas taps, &c., operated from a distance." No. 1353.
HOWLETT & Co., LTD., M.—"Thermostatically controlled gas valves." No. 1832.
KRUGER, J. Q.—"Gas igniter." No. 1370.
LILLEY, J. H.—See Brain, T. H. No. 1858.
OLSEN, J. A. E.—See Kruger, J. Q. No. 1370.
PARIS, W. S.—See Greenwood, H. V. No. 1383.
POTTERTON, A. B., POTTERTON HEATING ENGINEERS, LTD., and POTTERTON, T. F. C.—"Thermostatic controlling devices." No. 1720.
PREMIX GAS PLANTS, LTD.—"Ovens, driers, &c." No. 1495.
RADIATION, LTD.—See Howlett & Co., Ltd., M. No. 1832.
RAINCHON, L.—"Gas producer furnaces." No. 1137.
UNDERFEED STOKER COMPANY, LTD.—"Screening apparatus." No. 1850.
WERPE, E. F. DE.—"Fire grate for burning coke." No. 1195.
WHITFIELD, C.—"Gas stoves." No. 1627.
YATES, H. J.—See Howlett & Co., Ltd., M. No. 1832.

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr	NAME.	Quotations. Jan. 24.	Rise or Fall on Week.	Transactions Lowest and Highest Prices During the Week.
£			% p.a.	% p.a				
171,978	Stk.	Aug. 15	5	5	Aldershot 5 p.c. max. C.	70–75	..	74½–75
522,992	,,	,,	4	4	Do. 4 p.c. Pref.	71–74	..	..
1,551,868	,,	Sept. 26	7⅞	7⅞	Alliance & Dublin Ord.	93–96	..	94–95
374,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	60–63	..	..
522,655	,,	Aug. 29	7	7	Barnet Ord. 7 p.c.	112–115	..	114–115
300 000	1	Oct. 24	1/4⅛	1/4⅛	Bombay, Ltd	16/– 18/–	..	16/6
172,500	10	Aug. 29	8½	9	Bournemouth 5 p.c.	13–13½	..	..
500 050	10	,,	7	7	Do. B 7 p.c.	12½–12⅝	..	
439,160	10	,,	6	6	Do. Pref. 6 p.c.	10¾–11¼	..	..
50,000	Stk.	Dec. 19	3	3	Do. 3 p.c. Deb.	53–56	..	..
162,025	,,	,,	4	4	Do. 4 p.c Deb.	72–75	..	..
357,900	,,	Aug. 29	7½	7½	Brighton & Hove 6 p.c. Con	113–116	..	113½–114½
371,880	,,	,,	6⅜	6⅜	Do. 5 p.c. Con.	100–103	..	102
1,287,500	,,	July 25	5	5	Bristol 5 p.c. max.	86–87*a*	..	..
855,000	,,	Sept. 12	7½	7	British Ord.	112–117	..	112–114½
100,000	,,	Dec. 19	7	7	Do. 7 p.c. Pref.	109–114	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	69–71	..	..
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb.	92–95	..	..
100.000	,,	Jan. 9	5	5	Cambridge 5 p.c. Deb.	88–91	..	..
100.000	10	Dec. 5	8	6	Cape Town, Ltd	8½–9½	..	..
100 000	10	Nov. 7	4½	4½	Do. 4½ p.c. Pref.	6½–7½	..	..
150.000	Stk.	Dec. 19	4½	4½	Do. 4½ p.c. Deb.	69–74	..	..
626.860	,,	July 25	6	6	Cardiff Con. Ord.	98–101	..	..
237 860	,,	Jan. 9	7½	7½	Do. 7½ p.c. Red. Deb.	97–100	..	..
157,150	,,	Aug. 15	6⅜	5	Chester 5 p.c. Ord.	90–95*b*	..	..
98 936	1	Oct. 10	†2/–	†2/–	Colombo, Ltd. Ord.	34/—36/–	..	..
24 495	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	19/—21/–	..	..
375,402	1	Oct. 10	1/9⅝	1/9⅝	Colonial Gas Assn. Ld. Ord.	20/6–22/6	–1/–	20/6
187,848	1	,,	1/7⅝	1/7⅝	Do. 8 p.c. Pref.	20/—22/–	..	..
2.073 280	Stk.	July 25	7	5	Commercial Ord.	90–95	..	9½–92½
475,000	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	54–57	..	54½
787,560	,,	Aug. 15	7	7	Croydon sliding scale.	104–107	..	105½ 106½
408,100	,,	,,	5	5	Do. max. div.	80–85	..	..
542 270	,,	Aug. 29	10	7	Derby Con.	118–121*e*	..	..
55,000	,,	Dec. 19	4	4	Do. Deb.	67–70*e*	..	..
209.000	,,	Aug. 29	5	5	East Hull Ord. 5 p.c.	73–75	..	..
1,002,180	10	Sept. 12	†7	†4	European, Ltd.	13–15	..	13⅝–14½
18,708,480	Stk.	July 25	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	18/6–19/–*f*	+/–/3	18/6–19/–
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60–62	..	61½–62
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76–79	+1	77–78½
5,602,620	,,	Dec. 19	3	3	Do. 3 p.c. Con. Deb.	56–58	..	57½–58
2,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb.	97–100	..	98½–99½
82,500	,,	Aug. 29	7	7	Hastings & St. L. 5 p.c. Conv.	98–103	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	78–83	+1	80–80½
70,000	10	Oct. 10	†10	†10	Hongkong & China, Ltd.	13½–14½	..	..
213,200	Stk.	Aug. 29	6	6½	Hornsey Con. 3½ p.c.	84–87	..	..
1 976,000	,,	Nov. 21	20	10	Imperial Continental Cap.	360–380	+10	360 379
223,180	,,	Aug. 15	3½	3½	Do. 3½ p.c. Red. Deb.	71–76	..	..
235,242	,,	Aug. 15	7½	8	Lea Bridge 5 p.c. Ord.	115–118	..	..
2,145,907	,,	Aug. 15	6½	6	Liverpool 5 p.c. Ord.	91–92*b*	..	..
600 000	,,	Sept. 26	7	7	Do. 7 p.c. Red. Pref.	100½–102½*b*	..	..
165,736	,,	Aug. 29	8	9	Maidstone 5 p.c. Cap.	122–127	..	..
63,480	,,	Dec. 19	3	3	Do. 3 p.c. Deb.	52–55	..	..
75,000	5	Dec. 5	†10	†10	Malta & Mediterranean	5½–6	..	..
392,000	—	Oct. 1	5½	5½	Metrop'itan (of Melbourne) 5½ p.c. Red. Deb.	92–95	..	..
541,920	Stk.	Nov. 21	†9	†6	Montevideo, Ltd	107–112	..	109–109½
2,061,315	,,	July 25	5⅜	5	Newcastle & Gateshead Con.	15/9–16/3*df*	..	..
682,856	,,	,,	4	4	Do. 4 p.c. Pref.	71¾–72¾*d*	..	..
691,705	,,	Dec. 19	3½	3½	Do. 3½ p.c. Deb.	65½–66½*d*	..	..
131,780	,,	Aug. 29	7/1/0	7/0	North Middlesex 6 p.c. Con.	112–117	..	..
396,160	,,	Aug. 15	5	5	Northampton 5 p.c. max.	76–79	..	..
300,000	,,	Nov. 21	7	9	Oriental, Ltd.	108–113	..	..
60,000	5	13 My., '15	—	—	Ottoman	0–½	..	..
205,162	Stk.	Jan. 9	8	8	Plym'th & Stonehouse 5 p.c.	107–110	..	..
424,416	,,	Aug. 29	8½	8	Portsm'th Con. Stk. 4 p.c. Std	113–118	..	..
241,446	,,	,,	5	5	Do. 5 p.c. max.	80–83	..	..
2 334,464	1	June 27	—	15	Primitiva Ord.	28/6–30/6	..	..
244,500	100	Dec. 2	4	4	Do. 4 p.c. Red Deb.	91–94	..	95
695,000	Stk.	Jan. 23	4	4	Do. 4 p.c. Red. Deb. 1911	77–80*	–2	..
416.345	,,	Dec. 19	4	4	Do. 4 p.c. Cons. Deb.	77–80	..	..
150,000	10	Sept. 26	6	6	San Paulo 6 p.c. Pref.	8⅞–9½	..	..
1,786 968	Stk.	Aug. 29	6⅜	6½	Sheffield Cons.	104–106*e*	..	..
95,000	,,	Jan. 9	4	4	Do. 4 p.c. Deb.	76–78*e*	+2	..
90 000	10	June 13	†4	†4	South African	4–6	..	..
6 609.895	Stk.	July 26	7½	5	South Met. Ord.	100–102	+1	100½–101½
500,000	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	106–109	..	107½
1,895 445	,,	Jan. 9	3	3	Do. 3 p.c. Deb.	54–57	+1	56
734,000	,,	Sept. 12	6½	6½	Do. 6½ p.c. Red. Db.	99–101	+1	99½–100
91,500	,,	Aug. 15	8½	8½	South Shields Con.	109–111*d*	..	..
1,543,795	,,	July 25	6½	6½	South Suburban Ord. 5 p.c.	101–104	..	10*–103
468,837	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	92–95	..	..
647,740	,,	Aug. 15	5	5	Southampton Ord. 5 p.c. max.	77–80	..	78½–79
121.275	,,	Dec. 19	4	4	Do. 4 p.c. Deb.	68–71	..	..
179,014	,,	July 25	8	8	Sutton Ord.	116–119	..	..
67,828	,,	Jan. 9	5	5	Do. 5 p.c. Deb.	88–91	..	..
250,000	,,	Feb. 21	7	7	Swansea 7 p.c. Red. Pref.	100–102	..	..
200,000	,,	Dec. 19	6½	6½	Do. 6½ p.c. Red. Deb.	97–99	..	..
1 002,275	,,	Aug. 15	6⅝	6⅝	Tottenham District Ord.	101–106	..	102½–104½
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	97–100	..	..
181,255	,,	Dec. 5	4	4	Do. 4 p.c. Deb.	72–75	..	..
182,380	10	30 Dec., '12	—	—	Tuscan, Ltd.	3¼–4¼	..	..
85,701	Stk.	Sept. 26	6	6	Do. 6 p.c. Red. Deb.	75–80	..	..
289,094	,,	Aug. 29	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	97–102	..	100½
88,336	,,	,,	5	5	Do. 5 p.c. pref.	85–90	..	..
1,180,970	,,	—	—	—	Wandsworth, Wimbledon, and Epsom Cons.	105–110	..	107–108
200,000	,,	July 11	5	5	Do. 5 p.c. Pref.	87–92	..	..
488,344	,,	Dec. 19	5	5	Do. 5 p.c. Deb.	91–95	..	..

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of Stock. * Ex. div. † Paid free of income-tax. ‡ For year.

Governor-General

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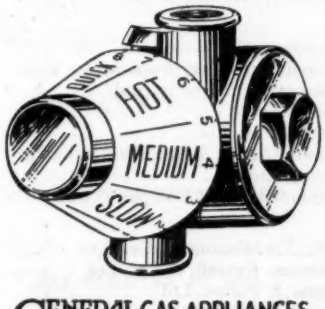

GENERAL GAS APPLIANCES LIMITED

Guide Bridge Manchester.

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CONTRACTS OPEN.

MALVERN URBAN DISTRICT COUNCIL.

TENDERS are invited for the Supply of GAS NUTS for delivery over Twelve Months ending September 30, 1931, to Gas-Works Sidings, Malvern Link, G.W.R.
Tenders to be delivered to the undersigned not later than Monday, February 3, 1930.
The Council do not bind themselves to accept the lowest or any Tender.
E. D. WOOTTEN, M.Inst.Gas E.
The Council House,
Malvern.

THE CITY OF STOKE-ON-TRENT.
(GAS DEPARTMENT.)

CONTRACTS FOR WORKS MATERIALS.

THE Council invite Tenders for the Supply to the Corporation Gas-Works of the under-mentioned MATERIAL, for the Twelve Months commencing the 1st of April, 1930:

No. 1.—SOAPS, TALLOWS, &c.
,, 2.—SHOVELS, &c.
,, 3.—COTTON WASTE, DUSTERS, &c.
,, 4.—MALLEABLE IRON and STEEL BARS, PLATES, &c.
,, 5.—BRUSHES.
,, 6.—BOLTS and NUTS, RIVETS, &c.
,, 7.—IRONMONGERY, &c.
,, 8.—BRASS STOP COCKS and COUPLERS.
,, 9.—WROUGHT IRON TUBES and FITTINGS.
,, 10.—OILS, GREASE, &c.
,, 11.—MANTLES.

Specifications, with Conditions and Forms of Tender, may be obtained on Application to the Chief Gas Engineer (A. MacKay), Gas-Works, Etruria, Stoke-on-Trent, and the Tenders, sealed and endorsed "Contract No. .... (Gas)," should be delivered to the Town Clerk on or before the 28th of February, 1930.
E. B. SHARPLEY,
Town Clerk.
Town Hall,
Stoke-on-Trent,
Jan. 27, 1930.

CITY OF NOTTINGHAM.

THE Works and Ways Committee are prepared to receive TENDERS for the SUPPLY of the undermentioned STORES and MATERIALS, the Contracts to commence on the 1st April, 1930, and to terminate on the 31st March, 1931:

A. CEMENT.
B. BLUE LIAS LIME.
C. RED BRICKS.
D. BLUE BRICKS.
E. TIMBER.
F. STONEWARE PIPES, &c.
G. STONEWARE PIPES, &c. (patent joints)
H. IRON CASTINGS, IRON GULLEYS, &c.
I. YORKSHIRE FLAGS, KERB, &c.
J. GRANITE SETTS, KERB and BROKEN GRANITE.
K. IRONSTONE SLAG, CHIPPINGS, &c.
L. RIVER GRAVEL.
M. CONCRETE SEWER TUBES.
N. PICKS, SHOVELS, SCOOPS, &c.
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P. SCAVENGING and OTHER BRUSHES.
Q. LIMESTONE CHIPPINGS.
R. REFINED TAR.
S. PITCH.
T. CREOSOTE OIL.
U. TAR MACADAM.

Forms of Tender may be obtained on applying to Mr. T. Wallis Gordon, City Engineer and Surveyor, Guildhall, Nottingham, on payment of a deposit of 5s. each, which will be returned on receipt of a *bona-fide* Tender in accordance with the Specifications, providing such Tender is not withdrawn and is delivered by the time stated below.
Patterns and Samples may be inspected at the Eastcroft Works and Ways Depôt, London Road, Nottingham.
The Committee will not consider any Tender except on the authorized Form of Tender, which must be delivered to the undersigned, in the official envelope provided, on or before Monday, 17th February, 1930.
The lowest or any Tender will not necessarily be accepted, and Tenders will only be accepted from persons who conform to the conditions as regards paying the local standard rate of wages, &c., and to the working rules of the Nottingham District, applicable to the various trades.
By order,
W. J. BOARD,
Town Clerk.
Guildhall,
Nottingham,
Jan. 17, 1930.

BOROUGH OF OSSETT.

THE Corporation of Ossett invite TENDERS for the Supply of MATERIALS, STORES, WORKMEN'S TOOLS, &c., required in the Highways, Gas, Lighting, Water, Fire Brigade, Sanitary, and Education Departments, for One Year from the 1st of April, 1930, to the 31st March, 1931.
Specification and Form of Tender may be obtained at the Borough Surveyor's Office, Town Hall, Ossett, on application.
Sealed and endorsed Tenders to be delivered to me, the undersigned, at the Town Hall, Ossett, not later than 10 a.m. on Monday, the 17th day of February, 1930.
The Corporation do not bind themselves to accept the lowest or any Tender.
T. W. WILSON,
Town Clerk.
Town Hall,
Ossett,
Jan. 24, 1930.

CONVERSION TABLES.

THERMS.—Conversion Tables showing Cubic Feet, Equivalent in Therms, and Charge to Consumer at your price per Therm. Price 5s. each, duplicates 3s. each.
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COMPANY NOTICES

SOUTH SUBURBAN GAS COMPANY.

NOTICE is Hereby Given that the ANNUAL ORDINARY MEETING of the Proprietors of this Company will be held at the Cannon Street Hotel, Cannon Street, London, E.C. 4, on Friday, the 14th day of February, 1930, at Twelve o'clock noon precisely, for the following purposes:

To receive the Report of the Directors and Statement of Accounts for the Year ended 31st December last.
To declare a Dividend for the Half-Year ended the same date.
To elect two Directors and one Auditor in the place of those retiring by rotation.
For general purposes.

Dated this 29th day of January, 1930.
By order of the Board,
WILFRID WASTELL,
Commercial Manager and Secretary.

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